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ABSTRACT

Electronic Networks for Interaction (ENFI), an instructional tool for teaching reading and writing using computer technology, improves the English reading and writing of deaf students at all educational levels. Chapters address these topics: (1) the origins of the technique; (2) how ENFI works in the classroom and laboratory (software, lab arrangement, managing the technology, encouraging written interaction, integrating writing and sign language, integrating ENFI with curriculum, and adapting teaching to the medium); (3) ENFI in deaf education and whole language instruction; (4) ENFI activities (topical discussions, discussing a reading text, math concepts/problems, science concepts/vocabulary, class projects, teacher-posed problems, hypothetical crises, collaborative story-writing, and focusing on English structure); (5) factors that can influence the quality of ENFI discourse (number of participants, discussion topic, teacher's role, activity type, classroom management, and student's written English proficiency); (6) interactional scaffolding in network conversations (modeling vocabulary, spelling, narrative, elaboration, task focus, and scaffolding off the network); and (7) language development on the network. A list of software companies, with addresses, is appended. Contains 26 references. (MSE)

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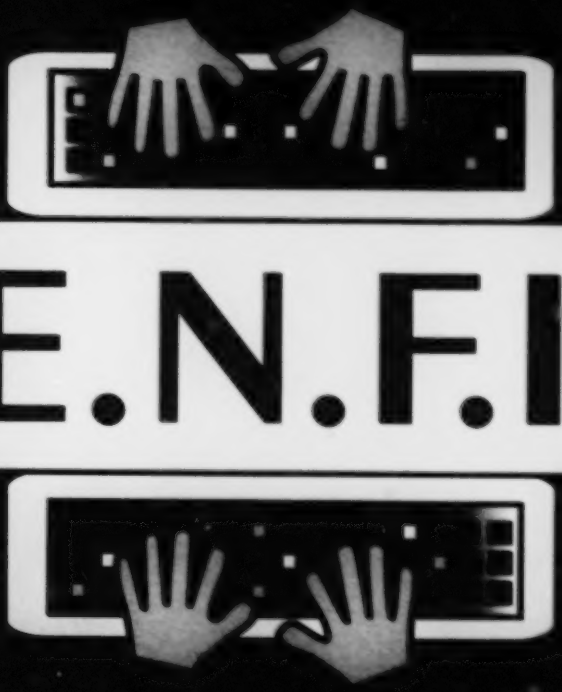

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Using ELECTRONIC NETWORKS FOR INTERACTION in the Classroom

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by Joy Kreeft Peyton and Martha French

Making English Accessible:

Using ELECTRONIC NETWORKS FOR INTERACTION in the Classroom

by Joy Kreeft Peyton and Martha French

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Pre-College National Mission Programs
Washington, D.C.

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Joy Kreeft Peyton and Martha French

Introduction: Electronic Networks for Interaction

Electronic Networks for Interaction, often called ENFI, is an instructional tool for teaching reading and writing using computer technology. ENFI is not a particular hardware, software, or teaching methodology, but a medium in which students and teachers communicate with each other via a computer network during all or part of the class. Initially developed for college-level deaf[1] students, ENFI is now used with deaf and hearing students, from elementary school to college.

Used with deaf students, ENFI fits well with curricula that emphasize social, meaning-centered language learning. Whereas the network activities vary according to student, teacher, and curriculum goals, they share the common feature of providing a way to communicate in written English—in real-time—for authentic purposes. This authentic use of the language results from students' wanting to say and understand things for their own purposes. When used this way, the resulting social interactions shape the individuals' personal power to create language (Goodman, 1986). This book describes how ENFI has been used with elementary-aged deaf and hard of hearing students at the Kendall Demonstration Elementary School (KDES), part of Pre-College Programs at Gallaudet University.

Background

ENFI was developed in 1985 at Gallaudet University by Dr. Trent Batson (of Gallaudet's English Department) and Dr. Joy Kreeft Peyton (of the Center for Applied Linguistics in Washington, D.C.) as an approach to improving deaf students' written English. During the 1985-86 academic year, Batson and two other teachers began using ENFI in their English

1 In this book, the term "deaf" is used to describe children and adults for whom the primary channel for receptive communication is visual.

classrooms at Gallaudet with the idea that if deaf students were going to work effectively with extended texts—if they were to become competent readers and writers of English—they needed to experience the language in functional, communicative ways. Thus, ENFI is based on two central concepts: 1) that languages are more effectively learned through authentic interaction, used for students' own purposes, and 2) that students need ongoing feedback from others (both teachers and other students) on the effectiveness of their written messages, which they are able to get in the context of this authentic language use.

News of this educational innovation spread quickly on Gallaudet's campus. Instructors at the Kendall Demonstration Elementary School, located on Gallaudet's campus, soon became interested in exploring ENFI activities with elementary deaf students and in 1987 an ENFI network lab was set up at Kendall. Since that time interest in ENFI has grown at the elementary level, prompting the need for curricular support and interest in the systematic evaluation of its use.

THE "TEAMING WITH TEXT" PROJECT

During the 1989-90 school year, with funding from the Literacies Institute in Boston, Peyton conducted a descriptive study of the uses of ENFI at Kendall. The study was designed to be non-intrusive, using naturalistic research methodology. Peyton and Anne Marie Baer, the research assistant on the project, worked with upper elementary and middle school teachers, observing ENFI classes and classroom activities related to preparation for and follow up of network use. They videotaped classes, interviewed teachers and students, and collected ENFI transcripts.

This work paved the way for Teaming With Text (TWT), a joint endeavor involving Gallaudet University's ENFI Project, Kendall Demonstration Elementary School, and the William D. Clinite Center for the Hearing Impaired in Tulare, California. The TWT group, with grant monies from the U.S. Department of Education, set out to see how ENFI could be integrated into the curricula at Kendall and Clinite.

The TWT project was successful in reaching its goals. It documented teachers' use of ENFI within the meaning-centered and child-centered curricula at Kendall and Clinite. In the process, teachers and researchers discovered new strategies for achieving teaching and learning goals. ENFI became "institutionalized" at both sites, and continues to be an integrated part of both instructional programs. Since its beginnings in Gallaudet classrooms, ENFI has spread to schools across the country. Its popularity has been supported by the increase in computer networking in educational programs. Changes in education have also highlighted the importance of process, conversation, and social language play in the development of writing, all features of ENFI use. In the education of deaf children, increased recognition of the instructional value of ASL (American Sign Language) has lead to an interest in using bilingual strategies to develop literacy skills in deaf students. ENFI has demonstrated its usefulness as a vehicle for translating these theories into classroom applications.

About This Book

Thanks to the continued study of ENFI at Kendall Demonstration Elementary School, the "how to" of ENFI and the effects of its use on students have been well-documented. Our purpose in creating this book is to share what we have learned with those who are contemplating using ENFI or those who are interested in our experience with it — how ENFI works, how it fits into a whole language program, what kinds of ENFI activities are used by Kendall teachers, factors that can influence the quality of network discourse, and conversational dynamics that affect communication via the network.

This book is written for a variety of individuals within the educational setting, as the implementation and use of ENFI draws on the expertise of computer specialists and administrators, as well as teachers and aides across the curriculum. ENFI is not limited to language arts classrooms; Kendall math teachers use ENFI to develop students' math language to create and solve problems. Nor is ENFI's most effective use limited to a particular age-group of students. The TWT project focused on middle school students (ages 10-13), but ENFI has been used with students as young as 7 years old, as well as with high school and college level students.

What individuals want and need to know about ENFI will vary, depending upon their role and their interests. For that reason, we have divided this book into many topics, including the most basic information—"ENFI in the Classroom: What it Looks Like, How it Works, the Challenges it Poses." If you are unfamiliar with ENFI, this first chapter is essential reading. Beyond that, the various chapters add layers of information about the use and benefits of ENFI and may be read according to interest and need. This book is intended to explain ENFI and answer questions about its use; we hope it also conveys the excitement we have experienced interacting with our students in written English through this dynamic medium.

ENFI in the Classroom:
What It Looks Like, How It Works, the Challenges It Poses

This chapter describes the physical arrangement of the ENFI lab at Kendall Demonstration Elementary School, the hardware and software needed to set up an ENFI lab, and the nature of the written interaction in ENFI sessions. It also discusses some of the issues that teachers and schools using ENFI have faced, and describes strategies and solutions that have worked for them.

The ENFI Lab and Software

ARRANGEMENT OF THE LAB

An ENFI computer lab can be set up in a variety of ways. In the lab at Kendall School, the computers were originally distributed around the outside of the room, facing the walls (see Figure 1 on the next page). The lab was set up this way before ENFI software was installed, because it was assumed that it would be used by teachers working alone, using word processing. This setup turned out to be useful for classroom instruction in some ways, but not useful in others. Because the center of the room was empty except for a round table for magazines and papers, students and the teacher could easily turn in their chairs or walk around the room to sign with each other, and some classes made extensive use of this signing space. On the other hand, some of the teachers were frustrated because they couldn't see the students without turning around. These teachers preferred a different configuration, with the computers in a circle, facing the center of the room and each other. When the ENFI lab was moved to another space in the second year of the project, the teacher's computer was placed to face all the others, which faced toward the outside of the circle. Some labs at other locations now have desks in

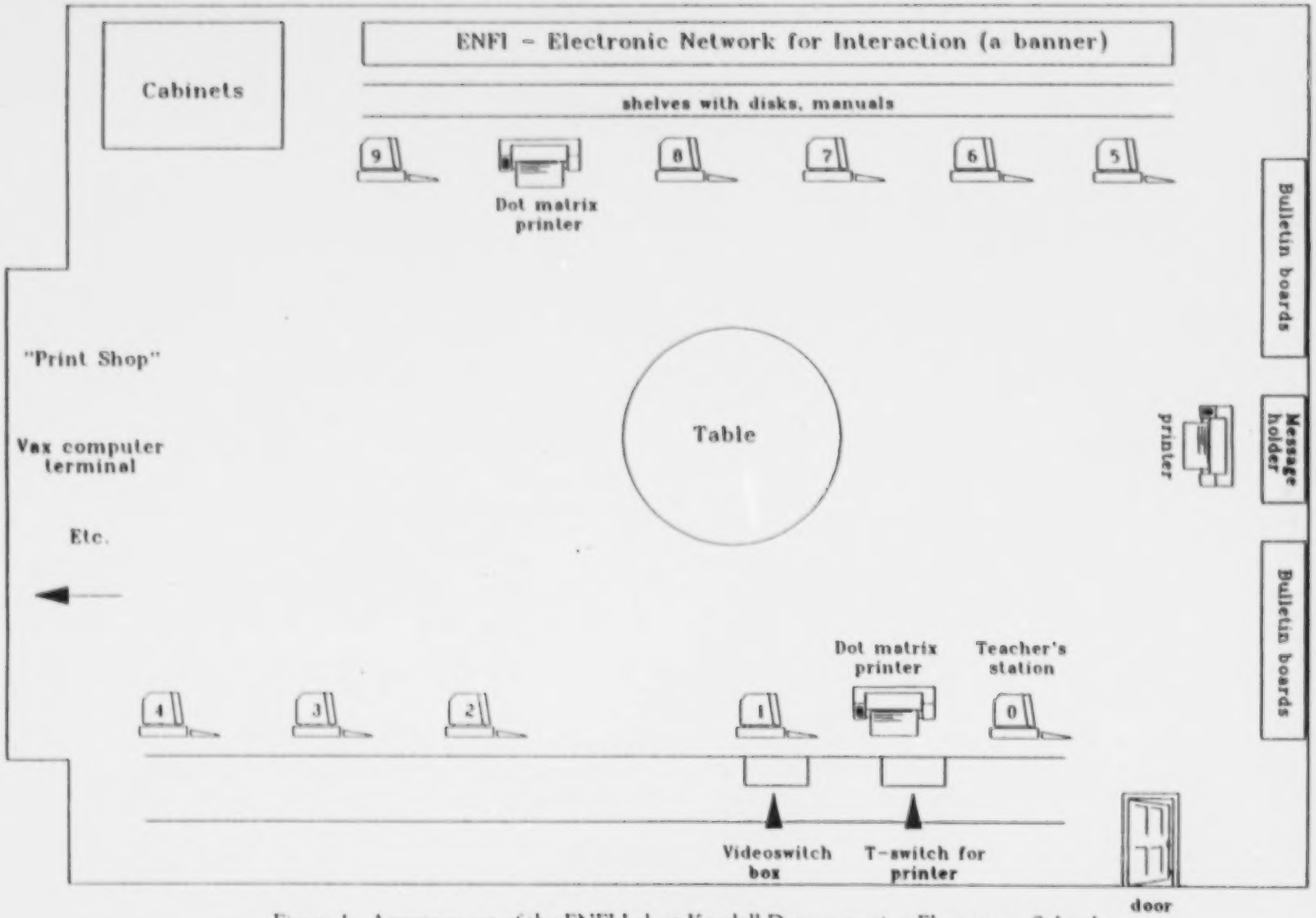


Figure 1: Arrangement of the ENFI Lab at Kendall Demonstration Elementary School during the Teaming with Text Project. Numbered computers are networked IBM PCs. Computers face the walls.

which the computer screens are lowered into the desk flush with the desk top and covered with tinted glass, so participants can see each other easily.

SOFTWARE

The software used at Kendall during the TWT Project was *Realtime Writer*, developed by Realtime Learning Systems in Washington DC, which runs on IBM and IBM-compatible computers. With *Realtime Writer*, the computer screen is divided into two windows. In the lower window, individuals compose their messages, which remain private until the writer hits a key and the message is transmitted immediately to the upper, public part of all of the screens in the class, tagged with the name of the sender. As new messages are typed and sent, they scroll up the screen in a continuous dialogue, like a play script. The computer stores the entire discussion, which can be reviewed at any point during the class session and printed out in its entirety at the end.

The software also allows teachers to control some features of the discussions or the ENFI activity. For example, teachers can arrange students on channels so that whole classes are interacting together or students are working together in smaller numbers, down to pairs. Using a video switch, teachers can view, at any time, the writing of an individual student or a group of students on a channel, or can display the writing of one student to the entire class. The size of the composing window can also be set to accommodate from three to ten lines of text; most teachers in the project kept the default setting, which is six lines.

Figure 2 shows a sample student screen with this software. One student's message (Sally's) appears in the lower window, visible only to Sally. Teacher and student messages that have been sent to the class appear in the upper, public window. The class is working on channel one.

When the TWT Project started at Gallaudet, *Realtime Writer* was the only software available. Since then, other kinds of software used for ENFI-type interaction have been developed. For example, KDES recently installed the Daedalus Integrated Writing Environment (DIWE), a software package comprised of a number of different writing options, among them word processing and electronic mail. This package includes *Interchange*, a feature that allows real-time network conversations and runs on both IBMs and Macintoshes. Examples of other software for ENFI-type network interaction include *Aspects*, by Group Logic, and *Group Writer*, by Sunburst Communications. (See appendix for software company addresses.)

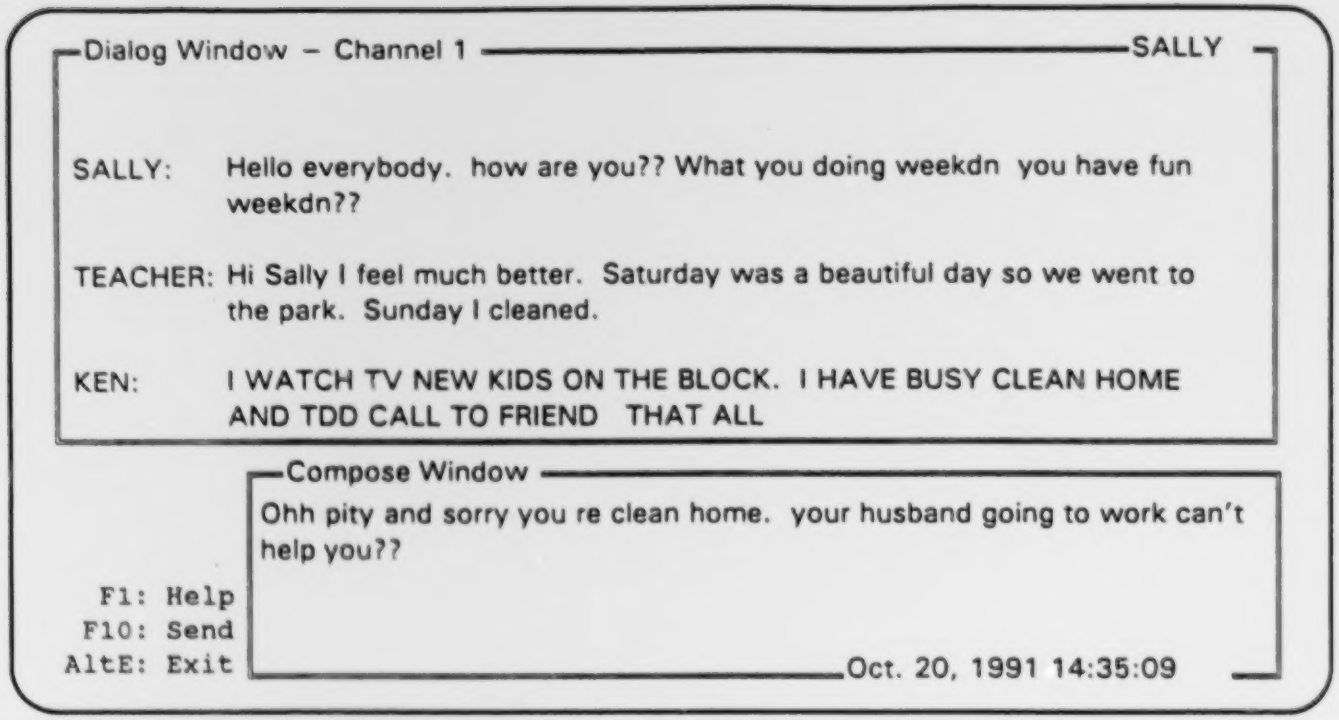

Dialog Window – Channel 1
SALLY
SALLY: Hello everybody. how are you?? What you doing weekdn you have fun weekdn??
TEACHER: Hi Sally I feel much better. Saturday was a beautiful day so we went to the park. Sunday I cleaned.
KEN: I WATCH TV NEW KIDS ON THE BLOCK. I HAVE BUSY CLEAN HOME AND TDD CALL TO FRIEND THAT ALL
Compose Window
Ohh pity and sorry you re clean home. your husband going to work can't help you??
F1: Help
F10: Send
AltE: Exit
Oct. 20, 1991 14:35:09

Figure 2: Approximate look of ENFI computer screen with Realtime Writer software.

In addition to the software, the following are needed to set up an ENFI lab:

- Computer stations with network cards and cables. Most schools prefer to have one station per person in a class, if possible. If that is not possible, students can be paired at a station;
- A dedicated server (a computer whose exclusive function is to run the network software);
- A network operating system.

Interaction in ENFI Sessions

Writing is the primary mode of communication in most network sessions. The dialogue below, between two deaf elementary school students, 7 and 8 years old, gives an idea of what the interactions look like. (This transcript, like all subsequent transcripts in this book, has not been edited.)

Megan: Hello Helen, are you ready?

Helen: yes

Megan: Good, I got alots of presents

Helen: what dose?

Megan: Please repeat, I don't understand what you mean.

Helen: oh "what you did dose"?

Megan: What dose?

Helen: i mean what you did got christmas?

Megan: Oh okay, I got clothes, shoes, and some toys!! And some cabbage patch dolls too.

Helen: i got clothes, puppy pound, fluppy dog, and etc.

Megan: I got six newborn pound puppies for christmas too.

Helen: i don't know true or false about pound puppies?

Megan: Oh, thats part of toys.

Helen: false

Megan: Yes, right, you know all toys are false.

Helen: I have cabbage path's clothes

Megan: oh, that nice, I got two cabbage patch kids dolls.

Helen: oh, i got three cabbage patch kids doll.

Megan: very close. My real cat was very bad during the vacation.

Helen: what your did cat do?

Megan: OOOHh terrible thing, she toilet on moms favorite sofa, etc.

Helen: yes, bad cat. i want more know etc.

Megan: ok he mess my moms favorite plant, destroyed my moms old sofa as her stachting post, put her claws on washing machine, dryer things at unitily room VVEERRYY BBAADD CCAATT!!!!

Helen: your mom say kick out the cat?

Megan: Plus she ruined one of my favorite hat. No, she understand that she hated to be alone in house for two weeks without us, thats why she do that.
Bye i have to get off, i really enjoyed talking to you, hope to talk to you again at here.

Helen: ohoh, my kitty only out and cacht rat time stop bye good lucky bye

Megan: yeah me too, one boy cat out and one girl in, I have to go we will talk in way.

Helen: bye!!!

Megan: bye!!

Students use the English they know to produce their contributions. In this conversation, Megan was older and knew considerably more English than Helen, so she wrote more, kept the conversation moving, and requested clarification when she didn't understand what Helen was writing. Most students quickly develop ways to express emotion and emphasis with capital letters, repeated vowels and consonants, and punctuation.

The kinds of network interactions that occur vary from teacher to teacher and class to class. They often involve more than two students, interacting with each other and with their teacher. Variations in network use depend on several factors. These include:

- the purpose and focus of the class;
- the topics discussed and the background material used to spark discussion;
- the ages, interests, and English proficiency of the students;
- the number of participants writing on the network together; and
- the presence and role of the teacher.

(See the chapter on "Factors that Can Influence the Quality of Network Discourse" for discussion of the various factors involved and how they influence the interaction; see the chapter on "ENFI Activities" for examples of different ways to structure the interactions.)

In some classes, all communication occurs on the network; in others, network writing is accompanied by signing, as students work out the meanings and form of their and others' messages in the language they feel more comfortable with. In some classes, the whole class writes together with the teacher; in others, students work in pairs or small groups without the teacher. Sometimes, the teacher sets up a task to be worked on and procedures for accomplishing it; while at other times, the interaction is much more free and open-ended. Some teachers use the network without related preparation or follow-up; others prepare the students for the network sessions with discussions in sign language or readings, and follow up with signed discussions of the printed transcripts.

Whatever the activity, most teachers agree that ENFI interactions tend to have features of both face-to-face interaction and solitary composing (of course, the degree to which they are more like either depends on the activity). The conversation between Megan and Helen, on the previous page, illustrates the give-and-take and the spontaneous quality of the interactions, similar to face-to-face conversation. Participants often write relatively brief contributions, communicating to an audience they know and can see in the room. If students are actually engaged in a written conversation, and not just writing isolated text, they take account of, connect with, and build on the contributions of others. They greet and say goodbye to each other, agree together on topics, and ask and answer questions. In the examples throughout this book, the conversational nature of the writing is evident.

It is easy to see how network interactions also include features of written composition. Students don't actually *face* their audience; rather they look at a computer screen. They must compose, in writing, a message that must make sense to someone else, and they must do it using a language most of the students have not heard (or heard completely)— a language they are in the process of learning. Because they are left relatively alone to compose this message, they have time to work on it and change it as much as they want before they send it. ENFI transcripts often include examples of some students creating and sending short written compositions, primarily narratives of personal experiences; in other words, students' writing on ENFI often goes further than brief contributions to a conversation.

Issues Raised by ENFI Use

Different approaches with computer networks present different challenges, but the following issues are faced by most teachers and schools. The solutions employed to address these issues can have a major impact on how successful network use becomes.

SETTING UP AND MANAGING THE TECHNOLOGY

Introducing even one computer with a word processing program can present a major challenge to a teacher, a school, or a classroom. A computer *network* is still more complicated. Someone must be responsible for setting up the technology and making sure it runs smoothly, especially at the beginning of the year or term. Teachers working on a tight schedule may not feel they have time to get the network going, including logging students in at the beginning of a session and getting them logged out properly at the end. They also may not have time to print a transcript at the end of each session. A series of difficult days will cause some teachers to stop using the network altogether.

Initial difficulties using the technology, both at Kendall and Clinite, showed that it was important to have a knowledgeable computer person available to help network users get in and out of the network program, solve problems that came up, and print the transcripts for the teachers to pick up later. At Clinite, this assistance was provided by the principal and a teacher aide; at Kendall, by a lab assistant. As the network software became easier to use, teachers needed to rely less and less on this special technical support.

GETTING USED TO WRITTEN INTERACTION

Network interaction is different in a number of ways from the kinds of classroom interactions that most teachers and students are used to. The most obvious difference is that participants in network discussions must read and write at the same time. While they are trying to compose their own contributions, the writing of others is scrolling up the screen, often rapidly. At first this dynamic can seem overwhelming and to some, impossible to handle. But this new way of communicating eventually becomes comfortable and familiar for most network users. They learn to think and type faster, focus more on some messages and less on others, and to fit in with the rhythm of their group.

The second difference has to do with who contributes to the discussion and when. In traditional classrooms, teachers often maintain control of the class by leading the discussion or by monitoring the turn-taking in the conversation. On the network, students can type and send messages whenever they want, which can seem disorderly at first. While some teachers find ways to control the network discussion by setting up turn taking rules until everyone becomes more comfortable with this new conversational dynamic, most teachers eventually find that they enjoy being part of the group, shaping but not controlling the discussion, and

that their students have opportunities to use English that was not possible in the traditional classroom.

Third, unlike face-to-face conversations, network conversations often involve more than one conversational thread at a time, especially when more than two people interact together on the network (this dynamic is discussed in detail, with examples of multiple threads, in the chapter on "Factors that Can Influence the Quality of Network Discourse"). Participants can send messages whenever they want to, and messages are not seen by other participants until they are sent. So even if everyone agrees to focus on the same topic, some people will take the topic in one direction, while others take it in another. There is no way to change this dynamic unless the class agrees that one person will write and send a message at a time, and that no one will reply until they have read that message. But a structure like this quickly becomes tedious for everyone. What happens more often is that participants get used to, and even enjoy, having different topics or different aspects of a topic discussed at one time, and they pick the threads they will follow and develop.

INTEGRATING WRITING AND SIGN LANGUAGE

Initially at Gallaudet, ENFI sessions were considered an English immersion experience, with teachers and students using little or no sign language[1] to accompany the activity. But when the focus shifted to elementary school students, who needed more discussions in their own language about their writing, network writing became closely intertwined with signed communication. Current bilingual approaches in deaf education emphasize the use of students' naturally-acquired language (in this case, ASL), to support and extend instruction in a second language (in this case, written English) [Mahshie, 1995]. Educators are seeking ways to effectively utilize both languages most productively in the curriculum. Throughout this book we give examples of different strategies teachers have developed to integrate signed and written interaction before, during, and after ENFI sessions.

INTEGRATING ENFI ACTIVITIES WITH OTHER PARTS OF THE CURRICULUM

Teachers usually have many more things to accomplish than time to do them, and network use is one more thing to add to an already full schedule. An ENFI session might involve walking to a lab some distance from the classroom, getting students settled down and concentrated on a task, and getting them off the network and back to their classroom at the end of the session. Teachers have found that ENFI sessions need to be *at least* a 40-minute time period to do all this, and an hour is better if possible. (However, longer sessions, 1 1/2 to 2 hours, for example, proved to be taxing for elementary students' attention spans.) Although some Kendall teachers schedule ENFI sessions once a week, at least twice a week

1 The term, "sign language," in this document, refers to American Sign Language (ASL), the language used for face-to-face communication by students at the Kendall Demonstration Elementary School.

seems to be ideal. Students need time to learn and experience writing in this interactive context to make the whole process more familiar and routine.

Those teachers who have experienced the most success with network interaction and who have continued with it have made it a vital, substantive part of the curriculum they already have in place. They found ways to use the network to augment and extend activities that they would normally conduct in sign language — discussing readings, solving math problems, proposing real-life problems and solutions — rather than as an extra activity that doesn't fit into the rest of the program. Frequently the lab session itself is accompanied by preparation and follow-up activities. When network use is not an important part of the instructional program, it is quickly crowded out by other, more pressing things.

ADAPTING FAMILIAR TEACHING HABITS AND MATERIALS TO THE NEW MEDIUM

Teachers often have a preferred teaching style and an extensive repertoire of accompanying materials—the blackboard, overhead projector, books, articles, handouts, videotapes, and manipulatives, as well as personal gesture and movement. When initially seated behind a computer screen facing students who are also behind screens, they may feel awkward not being able to do things and use materials that typically accompany their lessons. As Doug Miller, an English professor at Gallaudet University, put it,

> *I've taught for 11 years, and there are certain things that I like to do. I work with transparencies as kind of a team, pointing to things, making arrows, going from one side of the projector to the other. I stand up and talk about the ways that paragraphs are supposed to be arranged. I jump around and use my body. I've gotten used to using my body as a way to communicate.*
>
> *When I started using ENFI, I would take the materials for my regular freshman English class in the morning and run to my ENFI class in the afternoon and then think, "What am I going to do with these things?" I realized I couldn't even pass them out, because then the students would have to look at something other than the computer screen.*

Instructional materials can still be used, but *the ways* they are used must usually be adapted. Teachers can still use the blackboard, but it usually works better to use it before or after the ENFI session (see Schleper, 1992, *PreReading Strategies*, for further discussion). Discussions of readings are best done with brief texts, articles, or sections of books that students have read ahead of time and need only to refer to during the discussion. Some teachers have found it helpful to number the paragraphs of a reading that is handed out to everyone, for easy reference. Handouts that students read at the beginning of the ENFI session, before they start writing, can help guide student participation and provide students with problems to discuss or scenarios to create.

Teachers quickly discover that the network is not a good place to present new material in the form of a lecture. The medium is simply too slow and too cumbersome for teachers to sit and type a long discourse about a new topic, and students become bored reading it. Rather, the network is better used for group discussion, for collaborative working out of a topic. The teacher becomes a facilitator, part of an ongoing group discourse.

We have discussed briefly some of the key issues that the teachers faced when they started to use ENFI. As different teachers will have different issues, the solutions provided here will not work in exactly the same way. We hope, however, that the discussion and examples from transcripts in this book will give the reader ample information to handle problems that arise confidently and creatively.

ENFI in Context: Deaf Education, Whole Language

When ENFI was first used at the elementary level with deaf students, there were certain expectations in place because of past experience with ENFI at the college level. These expectations might be called the "vision" for ENFI: that students would be engaged in social interaction in a literacy-rich environment, using written language for communicative purposes, and thus develop confidence and competence in their literary abilities. One clearly-defined goal of the elementary school ENFI project was that ENFI would fit with what were already intelligently-crafted, meaning-centered, and child-centered curricula at Kendall School and the Clinite Center. Within the goals of these curricula, the teachers at both Kendall and Clinite actively experimented with ENFI and discovered possible new strategies for achieving their teaching and learning goals.

The chapters that follow will expand on these strategies and describe what was learned about student development and network interactions in the process. That information will be enhanced, however, if the reader has a contextual understanding of ENFI and language learning. In this chapter we provide that context by discussing ENFI and language learning from two perspectives: deaf education and whole language.

ENFI in Deaf Education

Many of the philosophies put forth during the history of deaf education have been about language and what it means to be a deaf person in a hearing society. Even people outside of the field are probably aware of the "oralism-manualism" controversy in deaf education, which is the argument about whether it is best to teach deaf children through speech (oralism) or sign language (manualism). The specifics of this argument have shifted during recent years. Now people often argue not about whether to use sign language or not, but about ways to use sign language, or whether to use natural languages such as ASL or manual codes for English accompanied by speech, such as Signed English. Why is this change occurring? Primarily

because of our increased knowledge of languages, their significance to culture, and how they are learned. Accessibility of language input has become a key factor in instructional decisions regarding language and deaf children.

Historically, there have been numerous strategies employed to make spoken languages accessible to deaf individuals. In addition to the practical benefits of communicating with the larger hearing society, it has been assumed that spoken language communication is a prerequisite to learning the written form of the language. Auditory strategies begin with such 19th century innovations as earhorns and continue with early 20th century hearing aids, audio loops, and, more recently, cochlear implants. Visual strategies have included passing paper and pencil back and forth, Cued Speech, and a host of manual codes for English accompanied by speech. Speech and auditory training continue to be used to instruct deaf children in receptive and expressive features of spoken languages. This partial list of strategies to make spoken language more accessible to deaf students suggests both the difficulty of the problem—making a spoken language accessible to people who can't hear—and the inventiveness of people when faced with a seemingly insurmountable task. However, the problem remains that for most deaf children, communication based on spoken language—whether through speech, print, or manual representation—has not resulted in a "full linguistic experience." Their linguistic experiences, from an early age, have not approximated those of their hearing peers or their deaf peers who have deaf parents who use American Sign Language as a primary language. Current thought, too, is that these early linguistic experiences, comparable to those of hearing children, are crucial to social, emotional, and later academic development.

We now know that natural languages need not be sound-based. We know, too, that American Sign Language (ASL), which is a visually based language, is the language most accessible to the average deaf person in North America for face-to-face communication. ASL is a rich and complex language with its own syntactic, semantic, and configurational rules (Klima & Bellugi, 1979; Wilbur, 1987). And, like other natural languages, it plays a central role in the maintenance and growth of culture—the culture of Deaf persons.

As increasing numbers of educators recognize the value of using ASL with deaf children in the classroom, programs are seeking ways to provide these students with opportunities to become competent in both written English and ASL. Throughout the United States and abroad, programs are coming to grips with a unique form of bilingualism and exploring how to best use both the language of the majority and the language of the deaf community to improve academic achievement and communication (Mahshie, 1995). It is recognized that students need the full linguistic experience that ASL provides and, at the same time, they need to develop competency in reading and writing English.

ENFI is an innovative addition to the instructional tool kit of teachers in this bilingual environment. Because it allows teachers and students to *write* to each other during class rather than *talk or sign* to each other, the English they are using for communication is *visible*, therefore accessible. ENFI, however, not only makes written English visible, it endows it with properties of conversation. Everything that anyone writes becomes visible to the whole group; it's as if

everyone is posting messages to one bulletin board which everyone else can see. After a time, as people read messages on the bulletin board and begin to respond to those messages, a written group conversation begins.

This accessible, conversational use of English for deaf students provides a means through which English becomes more vital and interesting. We have found that ENFI can be a powerful tool for moving deaf students toward knowledge of standard English. The reasons for this are discussed more fully in the next section which describes ENFI in the context of a whole language perspective on language learning.

ENFI as Part of a Whole Language Program

The most productive use of ENFI is not as an isolated exercise in written conversation, but rather as one part of a rich set of varied opportunities to communicate in sign language and in writing. ENFI is consistent with the philosophy of Kendall School's language arts program — a pragmatic, meaning-centered approach to language learning (signed and written), often referred to as "whole language." This philosophy has its roots in the pivotal research and teachings of such individuals as Michael Halliday, Ken Goodman, and Frank Smith. Halliday's (1975) work on the functions of language has added to our understanding of the importance of learning language through social use. Goodman (1986) broadens our understanding of how to keep language instruction whole, child-centered, and relevant. Smith's (1985) description of the reading process has helped us focus on the real purpose for becoming literate—to make meaning. These concepts, and how they are given shape in ENFI activities, are described here.

MICHAEL HALLIDAY - THE FUNCTIONS OF LANGUAGE

Halliday's research has had a tremendous impact on our understanding of how children learn language. His work has taught us that learning language involves learning to *use* language, "learning how to mean." Learning the structure and vocabulary of a language is tied to the realization that language has meaning. Children learn language by being surrounded by sequences of language, used in the social situations they are involved in. This language *in use* has purpose and social significance. It allows us to make things happen—demand objects and actions, control people and events, mediate relationships, develop concepts of self, ask questions about the world, extend reality through imagination, and inform others. If language is not used socially and for meaningful, functional purposes but is only studied in isolation, language learning does not occur.

Hearing children learn their native language in a natural way that supports Halliday's concepts about language learning. Given ample access to a fully accessible language, deaf children also learn their native language—a visual language—in the same manner and on the same time course (Petitto, 1993). However, deaf children, in order to become fully-functioning, literate

members of society, must also learn the language of the majority. For many deaf children this does not happen naturally as it does for hearing children, because they don't hear the spoken language, or they only hear it in a limited way. The way many deaf children *can* gain complete access to a comprehensive form of that language is through print.

Language activities involving print, however, particularly those used with deaf students, have often reflected traditional types of grammar instruction based on drill and practice. There is also the expectation that students will learn English through their reading and writing programs. According to Peyton and Batson (1986), "most [deaf students] have little conception of English as a conversational 'living' language, a medium of real communication, for they rarely use it for that purpose" (p. 1).

ENFI is unique in that it allows deaf students to experience English as a conversational, living language. When reading and writing on the network, students experience sequences of text created in a social context and used for a variety of purposes. Immediate feedback, turn-taking, physical proximity, and other characteristics of conversational language are intrinsic parts of ENFI activities. Furthermore, network interactions replicate the scaffolding patterns found in natural language learning situations, where more proficient language users model, extend, and expand language for less proficient users (see the chapter on "Interactional Scaffolding in Network Conversations" for discussion). In short, ENFI approximates many of the conditions associated with natural language learning.

KEN GOODMAN - WHAT MAKES LANGUAGE LEARNING HARD, WHAT MAKES IT EASY

Ken Goodman also talks about conditions for natural language learning by describing what makes language learning difficult and what makes it easy. Many of the conditions he describes as making language learning difficult are characteristic of traditional approaches to language arts instruction. For example, language has traditionally been taught from a "bottom-up" view of learning, which assumes that the "whole" of language is learned as a consequence of learning the smaller parts—letters, sounds, and phrases. Traditional approaches to instruction have also broken down language into sequences of discrete skills and focused more on the analysis of the language than its use. Finally, language lessons have often consisted of exercises that lack social interaction and fail to demonstrate real uses of the language.

ENFI interactions allow teachers and students to use English in the classroom in the ways Goodman asserts make language easier to learn. ENFI activities allow students to use English in the ways that are *real and natural, whole, sensible, interesting, and relevant*. Discussions about personal experiences, books read, and new concepts take place in a social arena in which learners raise topics, discuss ideas, and ask questions. Written English becomes the medium for making meaning. The fact that English becomes accessible and useful to the students, as opposed to a subject to be learned in parts and analyzed, is an empowering experience. These same attributes appear to be reasons why ENFI activities are so highly motivating for students.

FRANK SMITH - THE READING PROCESS

ENFI activities engage students in reading and writing. Network interactions also seem to foster in students the use of strategies that Smith describes as those used by fluent readers—*active involvement with text*, the *use of redundancy*, the *willingness to take risks to reduce uncertainty*. Smith explains that good readers actively apply background knowledge, they reread, and they make predictions as they process text. Good readers use redundancy in text, such as unfamiliar words repeated in different parts of a passage, to figure out meaning. Good readers also use the redundancy of explanations, examples, and definitions of words and concepts within the text. And finally, fluent readers take risks to reduce the uncertainty of unfamiliar texts. They make educated guesses about unfamiliar words and passage meanings based on background knowledge and their knowledge of cue systems—graphophonics, semantics, and syntax.

Network interactions seem to promote the use of these strategies in the collaborative development of written texts. Unlike the complete, printed texts that students usually read, ENFI interactions require students to actively process written text as it is being created. In contrast, it is possible for students to "read" through an entire book without fully comprehending it. ENFI readers, on the other hand, are continuously held accountable for comprehension by the immediate responses they give to and receive from other participants. They must reread, and struggle to figure out meaning and make meaning, or their responses don't make sense, and communication breaks down.

ENFI interactions are littered with examples of language redundancy that support students' attempts to figure out and make meaning. The cohesion that occurs in conversational language—parts of utterances from one conversational partner used in the response of another conversational partner—add an element of redundancy that does not occur in already completed and published printed texts. Also, skillful teachers can build redundancy into network interactions as they scaffold language for the students by explaining words, repeating and rephrasing questions, and providing examples of terms and concepts.

Risk-taking, too, is frequent in network interactions. The social nature of ENFI interactions motivates students to attempt new words, spellings, and sentence constructions and to try out new ideas. It seems easier for some students to take risks on the network, which involves more temporary form of writing, than to take these same risks on paper, a more permanent record of their efforts. Clearly, the rewards of immediate feedback on the network motivate many students to set aside reservations about whether their writing attempts are marred by sentence-level errors, misspellings, or lack of punctuation. Also, teachers quickly discover that it is impossible to focus on letter-perfect writing on the network; the interactions proceed too quickly. Students are more eager to attempt to communicate their thoughts and ideas when they realize they will not be penalized for errors.

Whole language classrooms require that reading and writing be *real* reading and writing, and not *exercises* in reading and writing. Children need to read materials of significance to themselves and to write about experiences of importance in their lives if they are to succeed

as readers and writers (Oxley, 1988). In whole language classrooms, children are encouraged to experiment with language and with reading and writing strategies in order to communicate with others (Clarke, 1987), and it is understood that errors are a natural part of learning. Based on our knowledge of whole language and our experience with ENFI activities, such activities appear to facilitate implementation of the language arts program across ages and levels of development. The next chapter describes specific ENFI activities used by teachers at Kendall Demonstration Elementary School.

ENFI Activities

During the past few years, many different ENFI activities have been developed and documented at Kendall. We list them here, and then give a brief description of each with a sample transcript. (Student names have been changed, but otherwise the transcripts are reproduced as they were written). This list is by no means exhaustive, but gives an idea of the variety of things that can be done on the network. Teachers are encouraged to develop new activities or adapt these, in line with their goals, their curriculum, and their students. (Beil, 1989, gives additional activities.)

As mentioned earlier and discussed in detail in this next chapter, messages written by individuals (student or teacher) are not seen by others until they are sent to the public screen. Therefore, the participants in the ENFI conversations shown here did not *experience* the conversations in the same way they appear in the printed transcripts, as if contributions followed each other in a linear fashion. (Initially, it can be somewhat disconcerting to read these transcripts, until one learns how to follow the multiple, simultaneous threads.)

As you read these activities, note the differences in the ages and abilities of the students, including the differences in their levels of competency with written English. Note, too, the variations of sign support used with the different activities. The next chapter, "Factors that Can Influence the Quality of Network Interactions," is based on observations of student/teacher interactions during these activities. The activities discussed in this chapter fall into the following categories:

- Discussing Personal or other Topics/Open-Ended Chat
- Discussing a Text
  - Open-ended discussion of a reading text (with beginning and more advanced students)

- Structured questions with beginning students
- Telling a story in ASL, then discussing it on the network

- Discussing Math Problems and Concepts
- Discussing Science Concepts and Vocabulary
- Planning a Class Project or Event
- Posing a Problem, Students Provide Solutions
- Creating Hypothetical Crisis Situations, Students Create Possible Resolutions
- Writing a Story Collaboratively
- Focusing on Aspects of English Structure
  - Why questions
  - Sentence expansion (with both adanced and basic writers)
- Playing Language Games

Open-ended Chat/Discussion of Miscellaneous Topics

Especially in the beginning stages of using the network, many teachers have open-ended discussions in which the students can discuss various topics, including weekend plans or activities, reflecting on a holiday, birthday, or class party, movies/TV shows they have seen, the weather, or the news. The teacher helps to guide the discussion with questions and extensions of student contributions, but also follows the students' lead.

These discussions, which can take place at any level of topic sophistication or linguistic complexity, give opportunities for students to work on focusing a topic, paying attention to what others have written and building on that, answering questions appropriately, giving enough information, and writing clearly so others can understand. At the same time, the teacher can model vocabulary, style, and language structure. When students become more familiar and proficient with the discussions, they can be given opportunities to lead them, taking the teacher's place or working along with the teacher.

This excerpt from one conversation comes from a class in the Kendall Special Opportunities Program for students who are functioning below their peers because of various factors—language, education, family background, or handicapping conditions in addition to deafness. The 12-year-old students whose writing is shown here are beginning readers and writers:

Teacher: Good Morning everyone!!!!!!!!!!!!!! You all look tired this morning. I am tired too.

Cathy: so you were busy this weekend? What did you do?

Mary: why didn't your sister come this weekend?

William: now football is finished what will you talk about? What did you do this weekend?

Mary: ...MY MOTHER I DON'T KNOW ... FRIDAY VERY SICK ME ...

Teacher: Ali thank you for your homework. I saw "look who's Talking too" I thought it was funny. What else did you do this weekend.

Mary: are you sick now? What's wrong?

Cathy: hello heather how are you feel ? okay i am feel little tired because i habve busy ... i need change my body can't change .. , i am not finshed to homework beacsuse i have busy from weekend i feel bad today.....

Teacher: What do you need to change on your body? CATHY

Cathy: i want change diffrerent and i need learing but i can't change my things .....

Mary: ...FRIDAY, SAT, SUNDAY VERY SICK MY MOTHER, SISTHER CRYSTAL GIVE MAKE SICK...

Teacher: Cathy so today you are not feeling so good about your body? Did the doctor in Conn call your mother ? Why are you feeling bad today?

William: on sat. moive" run " . father and brother . with moive .

Teacher: William so you saw the movie "Run" with your brother and father? That must be a good movie. Where did you see the movie? What is the movie about?...

As the conversation continues, the students add more and more detail to their topics.

Discussing a Reading Text

OPEN-ENDED DISCUSSION OF A READING TEXT

Discussion of a reading text can also be handled through ENFI as a fairly open-ended activity, with many of the same benefits described above. In this example, the class (mostly 9-year-olds) is discussing *Chicken Little*, which they have read together and discussed in sign in class. A brief portion from the beginning of the discussion is shown here.

Teacher: Good morning class. Who remembers the story about a little chicken? Can someone tell me the title?

John: i not know and i fogth

Tammy: THE LITTLE CHICKEN to teacher

Teacher: John, do you remember the filmstrip? What was the title of the filmstrip?

Teacher: Tammy, your title is almost right. Try again.

John: chicken little

Jamie: Chicken Little

Robert: babs [teacher], you are wrong I'right "chicken little"

Teacher: Yes, you are right. The title is "Chicken Little." Now tell me what happened to Chicken Little?

Teacher: Robert, you are right. The title is "Chicken Little." What happened to Chicken Little?

John: when acoron hit chicken head

Tammy: Please i will remember LITTLE CHICKEN?? It right????

Teacher: Yes, John, an acorn fell and hit Chicken Little's head. Where did the acorn come from?

Teacher: No, Tammy, your title is wrong. The title is "Chicken Little."

Jamie: An oak tree

John: acron tree

Teacher: Carol, do you know who Chicken Little is?

Tammy: Thank you to tell me you are right

Teacher: John, yes, the acorn fell from an oak tree. What did Chicken Little say?

Carol: MSR. Kau Fman the Chicken little it was fun?

Teacher: Carol, do you mean Chicken Little is funny?

John: sky is fall said chicken little

Teacher: John, yes, yes!! Chicken Little said, "The sky is falling!" Do you believe that? . . .

We can see the teacher juggling the conversation among several students to:

- follow up and give prompts: (to John) — "What was the title of the filmstrip?"
- confirm student answers: "Yes, you are right. The title is "Chicken Little."
- correct: "No, Tammy, your title is wrong. The title is "Chicken Little."
- model: "acorn" after John has written "acoron"
- get more students involved: "Carol, do you know who Chicken Little is?"
- push for more details: "Yes, John, an acorn fell and hit Chicken Little's head. Where did the acorn come from?"
- move the story retelling along: "John, yes, the acorn fell from an oak tree. What did Chicken Little say?"

From here, the class went on to discuss the other animals that Chicken Little warned, whom the group of animals went to see to warn that the sky was falling, whom they encountered on the way (the fox), and what happened to them. It is clear that some of the students (particularly John) understood and were able to write about the story much better than others, but everyone was able to participate to some extent in collaboratively retelling the story.

OPEN-ENDED DISCUSSION OF A READING TEXT WITH ADVANCED STUDENTS/HIGH-LEVEL READERS

This class of 13-year-olds is discussing a poem that they had read on their own the day before. In this case, they had not discussed the poem in sign language before this written discussion.

Teacher: Have all of you had an opportunity to read the poem by David Wagoner, "Staying Alive?" . . . Suppose you were lost in the woods, what would you do?

Denzel: I Think the poem is boring and i forced myself to read it anyway.

Teacher: What do you think about the author's advice?

Denzel: Get some food, water, and try to get some compass.

Roseann: How to survive.

Teacher: I'm glad you read it anyway, Denzel. Can you answer my question?

Bessie: I shall eat something that is edible then try to find my way out eating to survive on the way, sort of camping all alone but without supplies or something.

Teacher: How would you do those things? . . .

Cheryl: I think it's good, but why not get a book on survival instead? It'd be alot clearer , too. . .

Cheryl: I mean the author's adcdvice

Denzel: Try to find a way out and see if there s anybody that I can ask for the direction out. . ..

Bessie: Wilderness! no one around for miles!

Teacher: Good question, Cheryl. Can anyone guess at why the author wrote a poem instead of an essay? . . .

Roseann: I would read the book of survival before i was on the trip. But what if it was unexpected trip like plane crashing in the top of the mountains.

Bessie: I dunno, He might be a person who loved to write poems instead of sensible essay type statements.

Denzel: Because it will be better to write a poem instead of essay. Other reason may be because the story is short not long ensough to write an essay. . . .

STRUCTURED QUESTIONS ABOUT A TEXT WITH BEGINNING STUDENTS

These 13-year-old students are in the Special Opportunities Program. The teacher brought in simple stories and essays which she read to the students in sign language before going to the ENFI lab, where they discussed the story in writing. At the beginning of the year, this took

place in a very structured fashion—the teacher asked a question, each student answered it and sent his or her answer to the public screen, and then the teacher asked another question.

In this example in November, they are discussing an essay they have read about whales.

Teacher: Good Morning my wonderful students. What was the title of the story I read to you ?

Linda: The singing whales

Ed: Title is singing whales

Jane: 'THE SINGING IS WHALES '.

Sarah: The music whales.

Teacher: The title of the story was The Singing Whales. Is your answer correct? What kind of story was it, non-fiction, fiction, or historical?

Sarah: non-fiction

Jane: Fiction

Linda: The story is a non-fiction.

Ed: non Fiction

Teacher: The story is non-fiction. The scientist studied what kind of whales?

Jane: HB is whales.

Linda: The scientist studied a humpback whales.

Ed: The whales Hampback.

Jane: Hampback is whales.

Teacher: The answer is Humpback Whales. What was the name of the ocean that the scientist studied in?

Linda: atlanticocean

Ed: ahyhujmoing

Jane: Alnicoce.

Teacher: The name of the ocean was the ATLANTIC. We are finished.

Later in the year the readings became more advanced and, although the question-answer structure was maintained, the teacher and the students made more complex contributions to the discussion.

For example, in January, in conjunction with Martin Luther King's birthday, the class discussed an article they had read about him.. . .

Teacher: YES! You are all correct. We also talked about segregation. This must of been a terrible time for people to live in. Places were segregated like Churches and Hospitals. What were some other places that were segregated?

Mike: 1 school and 2 doctor and 3 church and 4 hospital and 5 bus and 6 restaurant. we are they are segregated.

Sally: White poeple segregated and Black poeple and the churches.

Jane: BUS , RESTAIRANT SCHOOL AND WATER FOUNTCINS I SAY WHY BECAUSE TELL PEOPLE BLACK AND WHATE IS SEGREGATED DIFFERENT PLACES YES .

Linda: Whhite people segeratedsit on the sat on bus then black people stand back of the bus.The white people segergated, the white people said "no" black people is sad about white people.

Teacher: I am so happy that Martin Luther King made our world a better place to live in. Black, white, Asian, Spanish, and Vietnameese can all go the same school and we can all be friends. We must help people to remember that all people are equal! We are finished talking about MLK now you can send a message to your friend. Have fun!

Sarah: Black and white poeople was seregation in hosopitals. White poeple out to black preson feel sad and hurt. They are go to another hospital. I have black friends.

STORY IS TOLD IN ASL/STUDENTS DISCUSS IT ON THE NETWORK

Our ENFI Project research assistant, a native ASL signer, told the class Hans Christian Anderson's "The Tinderbox" in ASL, using the classic comic to show the class the pictures while signing the story. The following day the teacher retold the story, again in ASL. The class discussed the story on the network the following two days, reconstructing it together.

We found that the students' network writing in these two sessions, after an introduction in ASL, was much more complex and interesting than it had been in other sessions, in which they had not had such an introduction. This class—13 and 14 year old Special Opportunities

Program students—also seemed much more motivated to write. The following example shows a small part of the discussion:

Teacher: A witch told this young woman who was a soldier about the tree and what was down at the bottom.

Lucy: then man want to more money and witch said "ok and come with me and follow me pls" then man ok and he walked with witch and then both ...

Teacher: What did the woman (witch) want the man to do?

Danny: to get the tinder box

Dirk: young boy said not have any money.

Joy: I dont remember story book but i like book yes.

Tom: CLIMB UP THE TREE TO GET HIM SOME MONEY AND GET HER MOTHER TINDER BOX

Marcie: Good story, dog name is Bull but man friend Bull and man is king can't marry pretty woman and pretty woman's parents angry no marry but man want love heart pretty woman but man idea want tell dog bull and dog run look under shsh see find pretty woman sleep bring run go to man house then man kissed pretty woman and bring back her house.

Discussing Math Concepts and Problems

One teacher used the network to discuss math concepts that had been covered in sign language during class. She felt that these 13/14-year-old students understood the concepts when they were expressed in sign language, but they needed to understand and be able to express them in print as well. Her students needed to be able to write about math, a goal in line with standards established by the National Council of Teachers of Mathematics.

In this example, the class is working on writing number sentences and story problems. In the course of the discussion, Steven and Dennis show marked improvement in their ability to perform these tasks (each turn in the transcript is numbered and turn numbers are included here, to show how this conversation was extracted from the larger discussion that involved the whole class of eight students).

1 Teacher: Hi everyone! Well, I'm glad we are all on ENFI now! Please explain to me what a number sentence is.

11 Dennis: You tell me a example.

12 **Cher:** SUZANNE FAST TO WALK 30 MILES DENNIS FAST OR LESS 01 MILE FOR WALK.

13 **Teacher:** Cher gave an example of a story problem. What would be the number sentence for her problem?

14 **Timothy:** 30-1=H or F or A

16 **Dennis:** 30-1=z

17 **Teacher:** Dennis and Timothy are right!

33 **Teacher:** Let's say I have $10.00, and I want to buy a toy that costs $5.50. What would the number sentence be that will help me know how much money is left?

34 **Steven:** 15.50

35 **Teacher:** Steven, what is the number sentence?

36 **Steven:** addd

37 **Teacher:** So you mean 10.00 + 5.50 = n?

38 **Steven:** I am forget

48 **Dennis:** 10.00-5.50=z

49 **Teacher:** Dennis, that is excellent! Now I would like for YOU to make up a story problem.

59 **Dennis:** joe collect 500 football cards and mary collect 38 football cards how many more joe than mary?

63 **Teacher:** That is an excellent problem that Dennis wrote. Who can think of the number sentence for his problem?

67 **Steven:** 500-38=n

71 **Teacher:** Steven and Harvey and Cher are right!

Discussing Science Concepts and Vocabulary

This class of 12-year-old beginning readers and writers is reviewing a lesson on the lungs they have just finished, which included a movie. In this conversation, the students have the opportunity to review and use the words and the concepts they have been reading about and

seeing in the movie, and to restate what they know. They receive continual feedback ("Wow! that's a thought Tom. I would worry too if my lungs were near my throat"), correction ("Okay, Pam that's good you got it but it is not AID it is AIR"), and extension ("Are you sure that you saw a balloon? Do we have ballons in our bodies?") not only from the teacher, but from the other students as well (Ernie clarifies that "the bollon in the body two lung"). . .

Tom: right pam you do is watch very good i am worry if lung was in up and near thort.

Teacher: No one has told me about the other movie yet. Does any one remember. This is a hint. The lungs and the other part work very close together to help our bodies function to the best of its ability. Who knows the other part?

Tom: We look at the bollon in the body

Burt: My favrteion is "dolly".

Teacher: Wow! that's a thought Tom. I would worry too if my lungs were near my throat. Why would you worry?

Burt: Tom understand what co2 o2 in movie now

Teacher: Are you sure that you saw a balloon? Do we have ballons in our bodies?

Tom: Burt what you said

Burt: no balloon in my bodie.

Pam: Bad aid and good aid...

Ernie: the bollon in the body two lung.

Teacher: That's a good question. What does co2 and o2 mean? and do you remember what h2o means?

Pam: that mean water ..

Burt: pam you did better not makeup about aid we not see aid in movies.

Teacher: Okay, Pam that's good you got it but it is not AID it is AIR. . . .

Elaine: Well today we will talk about the "LUNGS" and how we brethe or go to sleep and we brethe that way and we swim in the cold water in the pool anmd some people die when they can't brethe. So today we have to talk about the "THE LUNGS AND THEBALL LUNGS" today. this is good for you to know to learn how to get samrt to knowing of it. CO2 mean that not goood air

Planning a Class Project or Event

In this network session, the class is planning their Christmas party, and the teacher has offered to bring the cupcakes. The following excerpt about the decorations for the cupcakes comes from the second half of the discussion and is extracted from other contributions about who will bring what to the party.

This discussion gives these 9-year-old students opportunities to use appropriate vocabulary, to negotiate plans and meanings, to respond to challenges and queries, and to narrow down what they will do, in the context of an actual event that they are eager to participate in.

Teacher: Robert, what color of frosting do you suggest we use for the cupcakes?

Carlos: red and white frosting! babs [teacher]

Robert: babs, white and green and red

Teacher: John, do you want a red tree and white frosting on the cupcakes????

Carlos: yes babs

Teacher: John, you really want to frost the tree with red frosting?

Carlos: red frosting line on the tree babs

Teacher: Robert, your suggestion of white, green and red frosting is a good idea. What should be green? What should be red? What should be white?

Teacher: John, I understand you now. You want to make red tinsel on the tree with red frosting. That is a good idea. What color do you want the tree to be? White?

Robert: babs, white is snow green is tree red is hang ball

Teacher: Robert, that is a good idea to use white frosting for snow and green for the tree. John suggested we use red frosting for tinsel. For christmas balls, how about some M & Ms?

Robert: babs, I think M & M is too big

Carlos: robert no m & m are not big small ball

Teacher: Robert, you may be right. Maybe we can use cookie and cake decorations such as colorful sprinkles or silver balls and red hots???

Teacher Poses a Problem/Students Provide Solutions

This teacher wanted her 12 to 15-year-old students in the Special Opportunities Program to develop their problem-solving skills so they could function effectively at home, at school, and in their community. She wanted the students to recognize and understand a problem statement when it was presented in sign language and in writing, to be able to state a problem clearly themselves, propose clear and reasonable solutions, as well as to react appropriately to what others wrote, and expand on what they and others had written. She also wanted them to relate what they wrote on the network with other reading texts that had problems and solutions.

The class met on the network for one 45-minute session each week with a 20-minute preparation session (in sign language) and a 25-minute follow-up session for revising and editing what had been written on the network. The teacher and the classroom aide presented a problem to the class—one they had observed among the students or one that a student brought in. The aide signed the problem in ASL, and then the teacher signed it in signed English. The students, in sign, restated the problem and proposed solutions. Then the class went to the computer lab, the problem was written on the network, and the students proposed solutions in writing.

Eventually, students began to write their own problems on the network for the other students to solve. Listed here are examples of the various problems that were discussed throughout the year and an excerpt from one of the problem-solving sessions.

Problems presented for students to solve:

- Your mother sent you to the store to buy milk. She wants chocolate milk. You looked and can't find it. You will have to ask for help. The sales clerk is hearing. How will you ask for help?

- You are playing outside at recess. You see a friend stuck at the top of the slide. Your teacher is watching the other side of the playground. She is deaf and does not hear him yelling. Please get your teacher's attention.

- You are at the school library. You can't find the book you want. You must ask the librarian for help. What questions will you ask?

- You are having trouble reading the directions for your science project. Your teacher is ready to help. What questions can you ask?

- You are at school. You feel sick. You go to the nurse's office. Tell the nurse what hurts. Ask the nurse what to do.

- You will have friends over for Thanksgiving dinner. What time will you serve dinner? Who will you invite? What will you eat? What will you talk about at the dinner table? Will you enjoy yourself or will you feel depressed?

- How many times do you go to the dentist each year? One boy in my class has never been to a dentist. He is afraid to go. He thinks the dentist hurts people. I told him that I like my dentist. What would you tell him?

- We have a new kid in our class. He moved here from another country. He doesn't sign like most of us. He wears different clothes. He brings different food for lunch. Yesterday in the lunchroom some kids were making fun of the new kid. They wouldn't let him sit with us. I like him. I'd really like him to sit with me. I like to watch him sign. But, if I stick up for the new kid maybe my other friends won't like me. What should I do?

- There was a spelling test with very hard words. A boy in the class wrote some of the words on his hand, and the teacher saw it when he was tying his shoelace. She said he was cheating. The boy said that he did study, but he gets nervous in tests and didn't want to forget the words. How should he get ready for tests? What can he do so he doesn't cheat?

- Someone asks you to borrow your computer game and you say, "OK, keep it for one week and return it." The person does not give your game back. They tell you if you tell your teacher or your parents they will beat you up. How can you solve the problem? List possible solutions. (A student had described this problem to the teacher, and the teacher wrote it on the network.)

(A student wrote this next problem on the network.)

- I have a problem with christina last two week I went over sleep christina's house but I forget my T-shirt "Bart Simpson" and white pant i just called her on tdd, christina's father told her return my clothes than i told her many time she always forget to bring my clothes.

DISCUSSION OF ONE OF THE PROBLEMS

Teacher: There was a spelling test with very hard words. A boy in the class wrote some of the words on his hand, and the teacher saw it when he was tying his shoelace. She said he was cheating. The boy said that he did study, but he gets nervous in tests and didn't want to forget the words. How should he get ready for tests? What can he do so he doesn't cheat?

Linda: He need to review his work,prctice and studing the words until he remeber.

Jessica: The boy's parent can teach to him how to learn spelling words and He won't be nervous when He got A's

Loticia: I help him to do homework for study spelling words or he try to ask his parents for help.

Sarah: I can share with him to do hoework for study spelling words or explain about spelling words. Quiz on firday.

Loticia: . . . he ask your friend will help at him . your friend will taugth about hes' homework . he go to over yourfriend s' house he work study with your friend for homework.

Hypothetical Crisis Situation/ Possible Resolutions

One teacher started using the network with relatively young students, who had not used computers before. After several weeks of writing as a whole class on the network, the students felt insecure about their writing and became frustrated, and the class decided to take a break from ENFI.

However, two students were interested in continuing, so the TWT research assistant took those two to the ENFI lab once a week during Language Arts. She presented them with hypothetical crisis situations, using Indiana Jones-type adventures as a general theme, to which they were to find a solution. At first the students had difficulty understanding the situations and providing relevant solutions, but gradually they began to provide appropriate responses to the crises. When the research assistant had them discuss their strategies for addressing the situations in sign language off the network before writing them, they began to collaborate well with her and each other in formulating their solutions.

The following excerpt, after the group of three had worked together for about two months, shows how well the students worked with each other and with the research assistant, building on each others' ideas and vocabulary. Background information in brackets, not part of the transcript, has been added for context.

Teacher: Good morning Indy and Mary! [2 characters in the Indiana Jones movies] Now you are both in the plane on the lake about 100 miles from Florida. . . . *[In the previous session, their plane, headed for Florida, had had engine failure and landed on a lake.]* An alligator is approaching. Indy's gun went to the bottom of the water. *[Indy had said in the previous session that he had a gun.]*

Mary: I will bring my some few food then I will give to an alligator.

Indy: Mary will throw meal to alligator then i swimmingto ground

Mary: Tooo me fast swiminng ...

Teacher: Now you both are swimming in the lake. The shore is a little far away. You both start to feel very tired and your clothings are getting very heavy. You both may not be able to reach the shore...

Indy: helicoptor come to low near water

Mary: helicopter coming to pick up to us go to florida and we will be very safe...

Teacher: The guys who rescued you told you that they're taking you to Florida but you notice the helicoptor is going north istead going south to Florida...

Indy: i hit to man off from helicopter then i drive the helicopter

Mary: I'll watch to him...

Teacher: Now you both are going back to Florida and World DinseyLand! Have a good time!

In April, the classroom teacher decided to have the whole class return to the lab for ENFI. In their first session, the two students and Anne Marie modeled for the others what they had been doing together. The following transcript was the result.

Teacher: Now you both are in the jungle and you see the swamp. The bridge is very weak and loose but you have to go across.

Mary: I swming through to arrive there.

Indy: i sling to alligator swimmer away i swin to ground

Teacher: Now you both finally reach the other end and are hiking in the jungle. All of the sudden Tammy fell into the quicksand. She is a little out of your reach.

Mary: I try hard to reach.

Indy: I sling to mary s hand out of quicksand

Teacher: Indy has rescued Mary! Now you both see someone hiding behind a bush. You both think that person is a tribal man.

Indy: i see how mary strong woman!

Mary: I take a think wood then I fool to him I talking then I hit with my wood in his head then I and Indy run around. I mean thick. . . .

Anne Marie's fieldnotes for that day described the rich off-network collaboration that occurred as the students wrote and the excitement that the activity generated among the other class members:

> *Everyone watched while Jamie and Tammy discussed their solutions in ASL and then typed them. I tried to use challenging vocabulary so they would ask me about it and discuss with each other. Jamie asked me about "swamp" and "tribal." Tammy asked about "hiking," "quicksand," and "sling," and if "bush" meant President Bush.*
>
> *The other students tried to participate in the discussion, and everyone started signing to each other. Tim got upset because he couldn't participate, and kept saying that he could easily do that.*

The class that had been insecure and frustrated was now clamoring for a chance to participate. The classroom teacher and Anne Marie decided that in the next ENFI session, the whole class would be on the network, working in groups of three (two students and a teacher). There would be a preparation time, when they would hand out papers with various crisis situations to be discussed and related new vocabulary. (One of these preparation sheets is provided at the end of this section.) This way, each group would work on the same tasks, but could do with them what they wished.

The success of this activity seems linked to the following features:

- An exciting theme was introduced - one the students were interested in, knew about, and were motivated to write about. The process they used with Indiana Jones adventures could easily be applied to other themes and topics as well.
- Small groups of students (usually two or three) worked together on the network with a teacher or teacher aide, who described the crises, gave vocabulary and other assistance when needed off the network in sign language, summarized what the students wrote, and kept the activity moving.
- Two students became very proficient at this activity, working on it for a couple of months and then modeling it for the other students in the class, who then worked in small groups on separate channels.
- Students signed their solutions with each other before writing, so they worked collaboratively.
- Handouts were used on which possible crisis situations were described and new vocabulary given.

ENFI PREPARATION SHEET

Theme: Indiana Jones
Characters: Indy, Mary, Alex, inside a cave hunting for a big gem.

Crisis #1. You all need to reach the other side but there is no bridge or water and the bottom is all the way down out of your sight.

Crisis #2. While walking, an earthquake came. Alex accidently slipped into a deep ravene out of your reach.

Crisis #3. After you all found a small shrine where the gem was hidden, you got locked out. The heavy rock rolled and sealed the tunnel where you came in from.

Crisis #4. You found the gem and are ready to go out but the tunnel collapsed. You saw the blue sky through a small opening up in the ceiling. The ceiling is very very high.

Vocabulary:

- out of your sight
- earthquake
- out of your reach
- accidently
- shrine
- gem
- seal
- tunnel
- collapse
- ceiling
- opening

Writing a Story Collaboratively

These three 9-year-old students, who had a relatively high level of English language proficiency, had been writing on the network for about six months when they wrote this story together - without teacher involvement. They took turns, each building on the contribution of the previous student (only the first part of the story is shown). There is a lot of creativity evident here, including the use of punctuation and repeated vowels and consonants for effect. As in the other activities described, there are also opportunities for language modeling, this time by the students—for example, Maria's explanation for Anna of the difference between "mare" and "nightmare" and of the meaning of imagination ("imagion").

Maria: hello let start our topic is "coming into my night mare" Once upon a time there was a boy named Tom he went to sleep he had night mare he . . .

Anna: what mare mean is?

Robin: it means a bad dream.

Maria: she is right

Anna: oh i see. his mare is about an vamprie. a vamprie want to eat he. he not want the vamprie to eat he.

Robin: he ran into a house that is haunted and he was in. The door slammed.

Maria: he started to be afraid he had alot imagion that mean he think what shall hapeen then he thought he was at the movies with alot of door that slammed. There is other mean to mare is a female horse night mare mean bad dreams

Anna: but he saw many vamprie. then he thought it is a false vampries. but it is real vampries!!!!!!!

Robin: he ran and run and fainted

Maria: then he woke up with blood on neck and say "ohhhhhh vvaammppiirree hhaadd bitt me" do you understood me?

Anna: then he ran to his mom but when he saw his mom and his mom is deid!!

Focusing on Aspects of English Structure

WHY QUESTIONS

The class is working on asking and answering *why* questions. The students, who are 9-years-old, both ask and answer questions and interact with each other, and the participation of the teacher and teacher aide (Pam) seems to add interest (especially the opportunity to ask the aide questions) and provides a model of questions and answers.

Teacher: Good morning class. Today, we will work on "why" questions. Be sure to answer all the questions the class asks you. I will start with Tammy. Tammy, why did your father go to Puerto Rico?

Roberto: jamie.w. Why are you not finish homework??

Tammy: Mrs. Kaufman, my father went to Puerto Rico because my father want to see their family.

Tammy: Ryan, why your car is messed?

Pam: Carol, Why do you like to dance?

Carol: Pam [teacher aide], why are you shy in our class?

Jamie: Robert because I did not see the homework in my bag

Roberto: yes my car is messed because my car is accient one week ago tammy.

Pam: Carol, you have asked me a hard question. I am shy in your class because I do not know all of you yet. When I get to know you better I will open up more. Is there anything else you wold like to know?

SENTENCE EXPANSION WITH ADVANCED STUDENTS

The teacher presents a simple sentence and has the students expand it with adjectives, adverbs, and prepositional phrases. In this example, the 13-year-old students are relatively proficient English users, and we see them playing off each others' ideas to develop more and more complex constructions.

Teacher: Good afternoon everyone. I'd like to spent a short time, about 20 minutes, working on expanding sentences. I will give you a short, uninteresting sentence which you will expand into a fascinating literary masterpiece. Ready? Here goes: The boy walked.

Shari: The white boy walked to nearby mall.

Cheryl: boy slouched as he walked

Bessie: The messy boy slumped and dragged his feet as he walked down the busy district.

Greg: The ugly boy with rich clothing walked quickly to the store.

Gary: The strange lookin' boy walked.

Cheryl: The hunchback boy slouched as we walked unsteadily to the styore. . . .

Shari: The ugly looking white boy limped towards the busy district where he wanted to go to a store there . . .

Cheryl: The conceited boy grinned with a macho smile to the adoring crowd of girls gathered around him.

Bessie: The rich and goodlooking walked proudly to a busy district where he was run over by a red mercedes. . . .

Shari: The rich spoiled boy walked very slowly, pushing girls out of his way. He jumped in the nearest sports car and drove of in the sunest.

Cheryl: The unconfident male didnot make eye contact with anybdy as he slouched to the mall.

Greg: And that car was a vw. buggy, shari.a 1657 vw.

Bessie: A ugly boy with a crooked teech grinned to every girl he saw and acted very macho as he walked to a bank unfortunaely that time was a holdup going on.

Greg: I mean 1957. . . .

Gary: The little ugly strange lookin' boy walked limpy to the store and he drove a lamborgini back home but unfortunately he got a car accident and his limpy lamborghini is in the junkyard. But luckly Gary Smith went to the junkyard and bought lamborghini for 50 cents and fix it to new lamborgini and its right at my house! . . .

SENTENCE EXPANSION WITH BASIC WRITERS

Here the teacher is doing the same exercise with more basic writers. These two examples show that students can do this activity at many different levels. The teacher simply adapts her presentation of it, providing more explanations and prompts, and the 12-year-old students produce expansions at their level of English proficiency.

Teacher: Today as I told you yesterday I want to work on making sentences more interesting or expanding sentences. . .

Teacher: Sometimes we write sentences that can be more interesting.

For example:

The boy walked.

Is that an interesting and exciting sentence? . . .

Teacher: Do you like that sentence?

The boy walked. . . .

Darren: No

Robin: No . . .

Gene: No

Teacher: Right Darren and Robin it is a boring sentence.

It is not interesting. . . .

Teacher: Can we add words to that sentence to make it more interesting?

The _____ boy walked _____. . . .

Sally: The lazy boy walked to store . . .

Ariel: The tall boy walked home. . . .

Teacher: Anyone else have different ideas?

Gene: The fat boy walking to the school.

Darren: The fat boy walked to the beach.

Don: the thin boy walked to school

Robin: The short boy walked to the swimming pool.

Ralph: The skinny boy walk to school.

Teacher: Excellent! Can you add an adverb to tell me how he walked? . . .

(Later in the lesson.)

Sally: The good girl ran slowly to go to Wild World.

Teacher: Sally, you've got the idea!

Anyone else?

Gene: The beautiful girl ran suddenly the outside track

Robin: The medium girl ran quickly to the metro bus . . .

Sally: The bad girl ran slowly to go to Pizza's hut. . . .

Darren: The beautiful girl ran suddenly in school. . . .. . .

LANGUAGE GAMES

Many different kinds of language games can be played on the network. Some of those shown here were initiated by students when they were left to work in groups without a teacher involved.

Word Games

- All the words you can think of that start with "a," etc.

apple	bear
aardvaark	bubble
atlas	belittle, and so on

- All the words you can think of that end with "a," etc. (This is a much harder game, but the students did play it!)

- Write a word that starts with the last letter of the preceding word

bear	red
dress	silly
yellow, etc.	

- Aspects of American culture/deaf culture that start with "a"

- All the things in the room that _____ (are round, are yellow, etc.)

(The eighth graders in one class initiated these games, unprompted, and played them in several ENFI sessions.)

Sentence Games

Twenty Questions - One student thinks of a person, place, or thing, and the others ask yes/no questions until they discover who or what the student has in mind. This game can be used to develop students' proficiency with asking and answering yes/no questions and their ability to narrow down possibilities based on information they collect.

Work with blocks of different colors and shapes. One student creates a design with his or her blocks, describes the design in writing on the network, and the other student who can't see the design tries to replicate it with blocks.

> I have blue and red (working with only colors)
>
> I have a blue square and a red circle (working with colors and shapes)
>
> There's a blue square on the top left; to the right of that is a red circle; to the right of that, an orange rectangle; below the blue square is a _____; etc. (This can get as complicated as the teacher and students want it to.)

Factors That Can Influence the Quality of Network Discourse

As shown in the previous chapter, using a computer network to interact in writing does not constitute *one* approach, activity, or teaching strategy. Instead, network writing is a mode of communication that is shaped by the social contexts in which it occurs. In our observations of various ENFI activities with different classes, we found that certain factors of the social context influenced the nature of the interaction that occurred on the network. Some of these factors (such as the topics discussed and the teacher's presence on the network) are within the teachers' control and may be used to enhance the quality of the interactions. Knowledge of others that may be out of teacher's control, such as the number of students in the class and the level of student proficiency with written English, can help further understanding of the dynamics of network writing and help teachers know what to expect. Each of the factors we identified as important is described here, with illustrative examples from the transcripts.

The Number of Participants

TWO-PARTICIPANT CONVERSATIONS

The number of participants interacting on the network clearly influences the dynamics of the written discourse. When only two students or one student and the teacher interact on the network, in pairs on separate channels, they naturally take turns sending messages and waiting for each other to finish typing, so there is usually topic coherence and conversational cohesion. That is, usually contributions are tied to each other, questions are followed immediately by answers, and statements are followed by related statements.

One such conversation between two students was shown earlier, in the chapter on "ENFI in the Classroom." The following conversation (part of a longer one) took place between an eight-year-old student and her teacher. (In this and all examples shown in this chapter, ellipses show where whole or parts of turns have been omitted. In particularly long transcripts, the turns are numbered.)

Teacher: Good morning! How are you? Easter is coming in a few weeks. What will your family do on Easter? My husband and I plan to see my family and we all might will eat out for a change. Will the school be closed during Easter time? I mean close on the following Monday after Easter Sunday?

Tammy: Good morning! I am fine.Yes easter will coming as few weeks.I not know what my mom've always secret what about present.... Ohh I see you will be fun int here.. Yes,I will not be there school..

Teacher: How long will you stay out of school? My husband is Jewish and we will also have a Passover celebration. Do you know what is Passover?

Tammy: Iam not know how many I out of there school..What mean Passover celebration?????

Teacher: Passover is a part of Jewish religion and tradition. Jewish families and friends get together for two nights. We all eat special foods and read and sing together to remember the days when moses freed Jewish people from Eygpt and slavery about 5,000 years ago. Jewish people were slaves for many many years until moses lead them out of Egypt through the Red sea. Have you seen the movie about Moses and the Ten Commandments before?

Tammy: No I never see that..

Teacher: You'll see that movie sometime later. That movie always comes back on television during Easter time.

Tammy: Maybe I will see that on later..What you want to talk?????

THREE-PARTICIPANT CONVERSATIONS

Even in a three-way conversation on the network, conversational properties of coherence and cohesion are likely to be maintained. This is demonstrated in the following example, shown earlier in the chapter on "ENFI Activities." Here, the teacher converses with two students, developing an Indiana Jones-type adventure together (one student has logged onto the computer with the name "Indy").

Teacher: Good Morning Indy and Tammy! Now you both are in the jungle and you see the swamp. The bridge is very weak and loose but you have to go across.

Tammy: I swming through to arrive there.

Indy: I sling to alligator swimmer away i swim to ground

Teacher: Now you both finally reach the other end and are hiking in the jungle. All of the sudden Tammy fell into the quicksand. She is a little out of your reach.

Tammy: I try hard to reach.

Indy: i sling to tammy s hand out of quicksand

Teacher: Indy has rescued Tammy! Now you both see someone hiding behind a bush. You both think that person is a tribal man.

Indy: isee how tammy strong woman!

Tammy: I take a think wood then I fool to him I talking then I hit with my wood his head then I and Indy run around.

Tammy: Oh I mean thick.

Teacher: That's good for today! We will have more adventures on next Wednesday. Have a good week!

MORE THAN THREE PARTICIPANTS

A different pattern appears, however, when more than two or three people communicate on the network at the same time (unless the teacher establishes a pattern in which one person makes a statement or asks a question and each student responds in turn). In these cases, the interactions are not so orderly. More than one topic may be discussed at a time, new topics may be introduced while old topics are still being discussed, topics may be dropped before completion, and conversational pairs such as questions and answers or statements and replies may not appear together in the scrolling conversation. Since ENFI classes at Kendall tend to range from three to eight students, these patterns are usually evident and are intensified as the number of participants increases.

For example, the following excerpt from a discussion of the poem "Staying Alive" by David Wagoner, also shown earlier in the chapter on "ENFI Activities," involved a teacher and five students, 13-14 years old.

85 Teacher: Suppose you were lost in the woods, what would you do?

86 Denzel: I Think the poem is boring and i forced myself to read it anyway.

87 Teacher: What do you think about the author's advice?

88 Denzel: Get some food, water, and try to get some compass.

89 Roseann: How to survive.

90 Teacher: I'm glad you read it anyway, Denzel. Can you answer my question?

91 Bessie: I shall eat something that is edible then try to find my way out eating to survive on the way, sort of camping all alone but without supplies or something.

92 Teacher: How would you do those things? . . .

94 Cheryl: I think it's good, but why not get a book on survival instead? It'd be alot clearer , too.

96 Cheryl: I mean the author's adcdvice

97 Denzel: Try to find a way out and see if there s anybody that I can ask for the direction out. . .

99 Bessie: Wilderness! no one around for miles!

100 Teacher: Good question, Cheryl. Can anyone quess at why the author wrote a poem instead of an essay? . . .

103 Roseann: I would read the book of survival before i was on the trip. But what if it was unexpected trip like plane crashing in the top of the mountains.

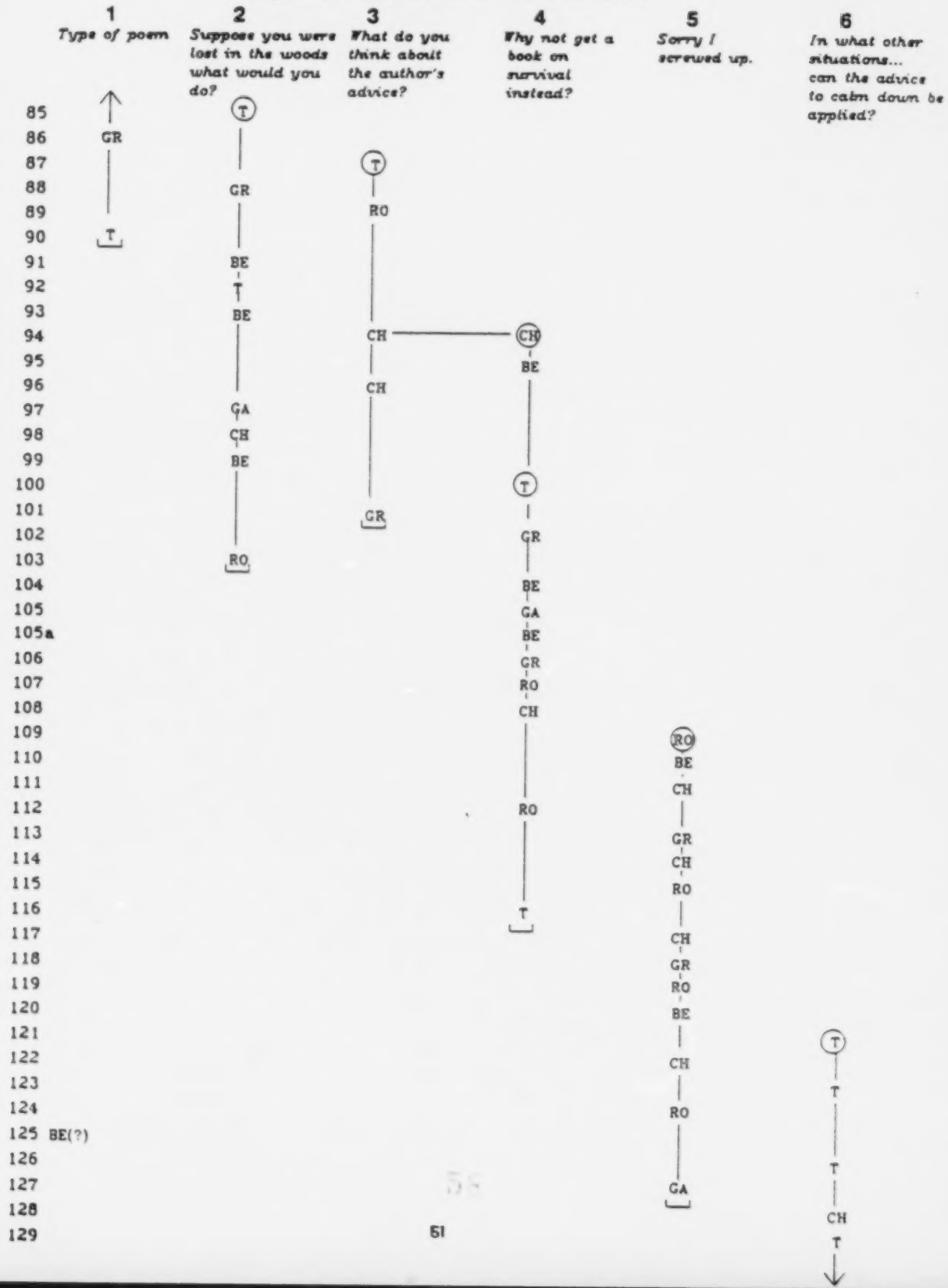
104 Bessie: I dunno, He might be a person who loved to write poems instead of sensible essay type statements.

105 Denzel: Because it will be better to write a poem instead of essay. Other reason may be because the story is short not long enough to write an essay. . .

Since the teacher asked two different questions (in turns 85 and 87), the students were answering both of them at the same time. In turn 88, Greg answered the question about what he would do if he were lost in the woods. In turn 89, Roseann answered the question about the author's advice. At the same time, Greg's response in turn 86 was to a question the teacher had asked earlier about what the students thought of the poem.

For ease of reading, this transcript excerpt shows the discussion of only two topics. However, as Figure 3 shows, four different topics were discussed from turns 85 to 105. Figure 3 shows

Figure 3: Topic flow in network discussions.



in schematic form how these various topic threads were introduced, dropped, and overlapped in this network discussion and how participants contributed to more than one topic thread. For example, we see that Cheryl (CH) wrote about what she would do if she were lost in the woods and what she thought of the author's advice, and she also introduced the question (topic #4) of why the author wrote a poem rather than a book. In order to make sense of the transcript of such interactions, the reader must find and follow the different topic threads. As mentioned earlier, this is difficult at first, but students seem to get used to it as they become more accustomed to network writing.

The Topic of Discussion

Another factor that influences the quality of network interactions is the topic discussed. When the teacher or a student formally announces a topic, the chances that all participants will attend to and continue the topic tend to be greater than when topics evolve freely. It appears that the chance of achieving attention to a topic is even higher if the topic is a focused, academic one, like "Today we are going to discuss the poem 'Staying Alive,'" than when the topic is more open-ended and personal, like "What did you do last weekend?" where all participants, including the person suggesting the topic, seem to feel free to write about whatever they choose.

The following examples come from a class of 13-year-old students in the Special Opportunities Program at Kendall. The first is an open-ended discussion about the weekend and preparations for Christmas.

Vincent: Hello everythink monoring!!

Linda: Hi Sarah, How are you? Are you ready for christmas? Will you open the present on mas-x?

Mike: Dear Everyone Good morning to everyone how are you ? I am fine. I will gift present to teacher and my friends for christmas.

Jane: GOOD monring to vincent.

Sarah: Hello ever;one, How are you doing? I am doing fine.

Teacher: How is everyone today?? Did you all have a good weekend?

Vincent: Hello Jane monoring how are you?

Jessica: Hi Everyone Listen I can't wait unit on Christmas.

Linda: To vincent, good morning vietnam that name of the movie!

Mike: Dear teacher i am wonderful nice weekend. yesterday i make a cookie for this friday christmas party.

Jane: HI Vincent, I am fine ok

Teacher: Jessica, Do you have a problem? How was your week-end? Did you go to dinner or just stay home and decorate your house for xmas?

Sarah: Too me can't wait and open for x-mas on christmas!

Vincent: Yes Jane too I am fine good for you ok

Linda: MS. Leslie [the teacher], Will you get all of us a present on friday?

Teacher: Sarah, what do you want for xmas? Do you believe in Santa Claus?

Mike: Dear Linda went you real a gymathnas vs than girl ?

Vincent: Yes why you ask name about vietum to Linda. . . .

The discussion topics varied from the weekend, to Christmas presents and parties, to the movie "Good morning, Vietnam."

In the second example from the same class, the teacher introduced the topic with a comment about a news item. After opening greetings, the students all addressed the question.

Vincent: Hello anyevery morning , HOW ARE YOU????? ask me?

Sarah: Hello everyone! How are ya?? I am fine alright!

Mike: Good morning to vincent and sarah and jessica i am fine to vincent how are you?

Sally: hello everone morning , i am fine ! ok.

Linda: Hello everyone ,How are you?

Vincent: Hello Sarah , yes allright and I am fine too !

Teacher: Good morning class how is everything? I hope we will have a good class today. I saw on 60 minutes that the war is still going on in Iraq. Now there is oil in the gulf and many birds and fish will die. I hope this war will end soon. How are you feelin this week?

Vincent: Yes Mike , I am fine too !

Sally: VINCENT , iam fine and tired , I watch the babby sitting everday.

Jessica: Hi Everyone, I am fine.

Sarah: Hello Vincent, What do you think about still war in Iraq?

Birds and fish will die from oil in gulf.

Vincent: Hello Teacher , yes i watch some on tv find news all yes i see on tv on oceae water oil !

Mike: Dear Leslie [the teacher] i not watch 60 minutes i hate to 60 minutes i like to watch a super bowl football yesterday . i real sad to fish and bird real died.

Jessica: Yes Mrs . Brewer [the teacher], I saw on news that the war. some more birds and fishs invited to all outside?

Sally: hello, leslie , I am fell ok and I ask to you about you saw on t.v war . and Iam real sad fish and birds was died. 60 minutes.

Sarah: Teacher, I watch on tv this morning, news say that Iraqis will became sick and hungry about water but can't drink. . . .

This is not to say that teachers should necessarily control all network discussions by proposing topics. But they should *be aware* that unless a topic is proposed by someone, and everyone agrees to contribute to that topic, the discussion *may* range from one topic to another in a rather unfocused fashion.

The Teacher's Presence on the Network: Shaping the Discussion

The teacher's role in network writing is very important. Some teachers pair students for conversations with each other and so do not actually write on the network with them. The conversations can be focused and productive if teachers: 1) carefully lay out the network task ahead of time (specifying, for example, that students should open the conversation with a greeting, pick a topic together and stick to it, and close the conversation); 2) interact with students in sign language while they work; and 3) review the transcripts in class to discuss the qualities of good network interactions (see discussion and examples in Peyton & Mackinson, 1989). However, when no direction is given for the discussion and the teacher does not interact on the network with the students, network interactions can gradually degenerate into shared insults or discussion of topics such as who loves or hates whom.

For example, the teacher-initiated discussion of the poem "Staying Alive," presented earlier (in the section on "Number of Participants Involved" in this chapter), initially seems somewhat confusing because of the multiple simultaneous topics, but when the various topic threads are followed, we can see that the students are participating in a coherent discussion in which they

continue topics and build on each others' comments. They also use relatively complex language, including hypotheticals ("I [would] eat something that is edible . . .") and clause embeddings (". . . try to find my way out eating to survive on the way . . .").

In contrast, examine the following conversation which took place between two younger elementary school students, around eight years old. The teacher was not on the network and did not give directions for structuring the conversation in any way.

Tim: john are you ok i am fine

John: what we team basketball out

Tim: YES JOHN I WANT TO PLAY BASKETBALL OUT SIDE JOSH DO YOU LIKE BASKETBALL JOHN AND I LIKE TO PLAY BASKETBALL AND BASKETBALL IS FUN

John: ga tech basketball

Tim: JOHN ARE YOU HUNGRY I AM HUNGRY

John: yes i am poor

Tim: I DONOT LIKE THATJOHN YOU ARE POOR TO

Tim: HHHHHHHHHHHHHHHHHHHHHHHHHHHHAAAAAAAAAAA AAAAAAAAAAAAAAAAAA JOHN.....

Johnhhh

Teacher: Robert, what color of frosting do you suggest we use for the cupcakes? John, how many bottles of root beer will you bring for our party?

John: red and white frosting! babs [the teacher] what is bottles?

Teacher: John, bottles is what the root beer comes in.

John: two rootbeer bottles babs

Teacher: John, do you want a red tree and white frosting on the cupcakes????

John: yes babs

Teacher: John, you really want to frost the tree with red frosting?

John: red frosting line on the tree babs

Teacher: John, I understand you now. You want to make red tinsel on the tree with red frosting. That is a good idea. What color do you want the tree to be? White?

Robert: babs, white is snow green is tree red is hang ball

Teacher: Robert, that is a good idea to use white frosting for snow and green for the tree. John suggested we use red frosting for tinsel. For christmas balls, how about some M & Ms?

Robert: babs, I think M & M is too big

John: mike no m & m are not big small ball. . .

The important role that the adult or more competent language user plays in scaffolding, or raising the level of participation of the child or less competent language user, is well-documented in language acquisition literature and discussed in the next chapter ("Interactional Scaffolding in Network Conversations"). Sowers (1982) has shown how this dynamic operates in writing conferences, in which the teacher provides various kinds of guidance, including focusing the child on the task, reducing the amount of freedom, and maintaining the direction of the task. Likewise, Bonk (1990) reviews studies that show that students' writing increases in semantic and syntactic complexity when there is a decrease in audience familiarity.

These same dynamics seem to occur in the network discussions. The teacher, who is older, a more competent English user, and not a peer, can have a tremendous influence on the ways the students communicate.

The teachers at Kendall shaped the interactions in many different ways. The teachers in the above discussions about "Staying Alive" and the class's Christmas party asked questions and then followed up with comments or more questions. Another teacher, who was working with

students who were new to the network and whose English proficiency was in early stages of development, asked a question, had all of the students answer that question, and then asked another one, as shown in the example on page 29. The students waited to participate until they saw the next question from the teacher. They typed their reply and waited for another question. The conversation was orderly, and students could see clearly what the other students had written. When the students became more accustomed to network interaction, the teacher loosened the controls and let them communicate more freely.

Another teacher working with similar kinds of students structured the interaction by holding one-on-one discussions with each student, even though the class was on the network together (examples of this are shown in the last section of this chapter, "Student Proficiency with Written English").

In each case, the teacher balanced the task, the topic, and what she perceived to be the students' English proficiency levels to shape the interaction and move it to a level that seemed both interesting and challenging to the students.

An important issue for teachers to consider is whether network writing is more effective for expressing ideas and content or for focusing on the correct forms of written English. In some classes, teachers initially establish strict rules about language use ("I want to see capitalization, punctuation, and correct spelling"). Students in these classes tend to pay more attention to *how* they and the teacher are writing ("Sally didn't capitalize i;" "You made a mistake, teacher" — the teachers invariably make errors themselves) than to *what* anyone is attempting to say.

Eventually, most teachers tend to drop these rules and focus on the purpose for and content of the writing. This may be because such strict rules about surface structure are difficult to enforce and ultimately limit the interaction, because the teachers realize that they make mistakes themselves, because the content becomes more important, or because teachers realize that excerpts of the printed transcript can be edited later.

Whatever the teacher's reasons for initiating or dropping strict rules about written form on the network, it seems clear that the conversational nature of the writing (discussed in the chapter, "ENFI in the Classroom") — which is produced and read quickly and so is different from planned, extended writing — makes a focus on form unrealistic and even impossible.

The Type of Network Activity

The type of activity the participants are involved in on the network can also influence the language they use. For example, in one class, the network was used for discussing math problems, the goal being that students would learn to think about math concepts in English. Since the goal was not to develop language fluency, student contributions tended to be brief answers to the questions.

Teacher: Do you know how many slices each Domino's pizza has?

Dennis: 5 or 4

Teacher: try again

Lucy: I want 5 pizza.

Timothy: WHY?

Dennis: 1 or 2

Timothy: 2 or 3?

Teacher: We will be ordering large pizzas. Each pizza will have the same number of slices in it. Do you remember how many slices are in each pizza?

Lucy: No!

Dennis: 12

Steven: 8

Teacher: Dennis is right. . . .

In another class, the purpose for using the network was to develop fluency with written English. The teacher valued longer, considered messages. She took time to compose her own messages, which tended to be short paragraphs, and the students did the same.

Teacher: Hello everyone. I am sorry I could not make it to class last week Thursday because my daugter had a doctor's appointment. So, how did you like the story, "The Tinderbox"? It was my favorite story when I was a little girl. Can you tell me what the story is about? . . .

Mary: Good story, dog name is Bull but man friend Bull and man is king can't marry pretty woman and pretty woman's parent angry no marry but man want love heart pretty woman but man idea want tell dog bull and dog run look under shsh see find pretty woman sleep bring run go to man house then man kissed pretty woman and bring back her house.

Ted: Wow mary how far can you remember the story.

Teacher: What did the soldier do when he got to the bottom? He went down with his knapsack and....?

Dan: TO LOOK FOR THE MONEY

Ted: collet the monay

Betty: the man no momey so the man saw witch woman and the man walk to seen that witch woman give to rope down on tree and the witch's grandmother give that tinder box and the soldier down looked for 3 door 1 place 2 place 3 place on door have money

Joseph: MAN MUST PUT THE APRON ON THE FLOOR SO THE BULL SIT ON THE APRON AND THE MAN OPEN THE GOLD MONEY IN THE BOX

Jenny: ... witch and man arrived at tree and witch said "you climbed to treepls and you get some more money and pls get thinderbox" then he said "ok I'll..." then man climbed at tree and he can't see down tree and but he surprise tree in have rich , wow and he looked 3 doors and he tried to open to door. Man opened the door one small thinderbox...

The Way the Teacher Manages the Classroom Space

In network interactions across distance (electronic mail or computer conferences), participants do not see each other, and all communication takes place in writing. However, on a local area network in which the participants sit at computers in the same room, the classroom space can be used as a communication space as well. Rules can either be established so that this space will not be used (for example, one teacher reminded students, "I want you to say everything through the computer. Don't talk to me. Don't talk to other students, except through the computer."), or the space can be used to plan and negotiate the written interactions in sign language. At Kendall, the computers face the walls, so the center of the room is open (see classroom layout in Figure 1 in the chapter on "ENFI in the Classroom"). In some classes the teacher and students used this space to walk around and see what others were writing, ask for spellings of words and clarifications, and elaborate on what they were writing. In these cases, the network transcript shows only a portion of the entire interaction that occurred. For example, this brief exchange took place on the network between a teacher and student.

William: on sat. moive" run" . father and brother . with moive.

Teacher: William so you saw the movie "Run" with your brother and father? That must be a good movie. Where did you see the movie? What is the movie about?. . .

William: home in moives like good run

Teacher: Ok William I know you liked the movie but I asked you to please tell me about the movie. What was the main idea?. . .

William: "Run" Call stupid man police cath run .

Teacher: William, Who ran? Do you mean a man was stupid and the police catch the man? . . .

In her fieldnotes, one of the researchers described the off-network, signed interaction that occurred at the same time between her, William, and the teacher.

> *I volunteered to spell "Hamlet" for William, but he said it is "Run" on the VCR. I told him to explain that it's a VCR movie from last Saturday night. . . . Heather [the teacher] told William off the screen to give a summary of the movie he saw. . . . Heather again told William off the screen to give a brief report about the movie. William asked if we were being nosey. I told him we're being curious, and I haven't seen it. . . . William asked me (with voice) how to spell "call," then he asked me if it also means by phoning someone. I said yes, that word has more than one meaning. Then he asked me how to spell "stupid" and "catch." I showed him how to remember how to spell words by looking for roots. He seemed to understand that.*

Harste, Woodward, and Burke (1984) point out that one "process universal" associated with literacy events is "negotiability," or shifting across communication systems to make sense of or respond to a literacy task. For example, children sometimes shift temporarily from writing to drawing during a particular writing task. Dyson (1993) describes rich drawings and oral conversations that interact with the written production of stories by children. In the above example, it appears that the teacher and research assistant allowed William to shift back and forth as needed between signed and written communication, thus giving him the support necessary to continue with the task.

Student Proficiency with Written English

The students' English language proficiency can make a tremendous difference in the way they interact on the network. While the technology allows all students to type and send messages any time they wish, some may send many messages, while others send few. Some may send short simple messages, and others, long complex ones. The following excerpts from one teacher's class in the Special Opportunities Program illustrate this point. The first excerpt shown is the second half of a network session, showing the whole class on the network together. (This excerpt begins at turn number 25 and ends at turn number 50.)

25 Teacher: Cathy do you have to vaccum and wash windows and things like that ??

26 Mary: ...I SEE TV WAR IN IARQ . OLD WATER TO IARQ,,,

27 Teacher: Mary what happened to the water in Iraq??

28 Cathy: YES I WASH ON THE WINDOW YES ALL HOUSE CLEAN ON SATURDAY LAST SATURDAY I CLEAN HOUSE FINISHED.....

29 William: MARY. LOVE NEW KID BLOCK

30 Mary: ...I SEE IN WAR IRAQ ALL MANY IN WATER DIE BECOME OIL KILL FISH BRID ALL DIE.....

31 Ali: I SEE TV WAR IN IRAQ OIL

32 William: CATHY. LOVE NEW KID BLOCK

33 Teacher: William you still have not answered my question. Who did you want to win the game?? Did you want the Giants to win or the Bulls to win??

34 William: ALI. LOVE NEW KID BLOCK

35 Teacher: Wow Mary You did watch what happened in Iraq!!! What do you think will happen?? How will they clean it up ??

36 Teacher: Ali What happens to birds and fish in all that oily water ??/

37 William: GIANTS WIN 20 . BULL WON 17 .

38 Teacher: William who did you want to win the game ????

39 Cathy: I SHOWER FINSH THEN CHANGE MY CLOTHES THEN I BREAKFAST FINSHED THEN I CLEAN MY BEDROOM AND DISH ANFINSH TV AND COMPUTER AND TABLE THREE FINSH I CALLED TO MY FRIEND THEN I LUNCH FINSH THEN I WATCH TV OTHER FUNNY SHOW FINSH,,,,,,,, THAT ALL

40 Teacher: Ok Cathy Did you watch all that news this weekend about the oil spill in Iraq?? What do you think will happen to all the birds and fish??

41 Cathy: NONO I NOT SEE TO ON NEWS NO

42 Teacher: William I know who won the game but who did you want to win ??

43 Mary: ...VERY BAD IN WAR IN IRAQ ALL MANY WAR KILL HURT IN IRAQ. KILL IN WATER DIE FISH . TV VERY SAD WATER IN FISH . MANY PEOPLER AND CHILD AND KID ON TV IN WAR IRAQ VERY BAD.....

44 Teacher: William please type and stop talking!!!

45 William: BULL WON 17 , GIANTS WINNER 20 .

46 Cathy: ALI I WANT MORE NEW KID ON THE BLOCK.. I LOVE OF JOE OKAY JOE'S EYE ARE BULE YES.....

47 Teacher: Mary do you know anyone who went to Iraq??

48 Teacher: Ok lets stop now you can turn off your machines now

49 Ali: I SEE TV IARQ IN WATER OIL OCEAN

50 Mary: ...WAR IN IRAQ . KILL PEOPLE HURT IN WAR IRAQ VERY BAD LIKE NOT IRAQ....

Now let's look at the participation of each student separately. Even though the whole class was on the network at the same time, the teacher essentially carried on a separate conversation with each student, writing their names so they'd know what was addressed to them. Here we pull out these conversations and we can see that the students participated very differently. Cathy and Mary wrote extended text in response to the teacher's questions. Cathy wrote about her activities during the weekend (even though the teacher had asked about the war in the gulf), and the teacher followed her lead, asking her questions about her weekend. Cathy focused on the same topic throughout the discussion, elaborating more and more on her activities in response to the teacher's questions. (In these examples, the contributions are numbered to show where they occurred in the larger discussion.)

Cathy

11 Teacher: Cathy - Did you watch any news this weekend ? Do you know about all that oil spilling into the gulf?

13 Cathy: NONONO I NOT SEE TO NEWS BUT I HAVE A BUSY I WATCH TV NEW KIDS ON THE BLOCK YES..BEACSUE I HAVE BUSY CLEAN HOME AND TDD CALL TO FRIEND THINGS THAT ALL

14 Teacher: Cathy what chores do you have to do around the house ??

19 Cathy: MY HOUSE IS CLEAN AND PRETTY MY HOUSE . . . THAT ALL

24 Cathy: OKAY ..... I CLEAN MY BEDROOM AND LIVINGROOM AND KICTCHEN ALL HOUSE ARE CLEAN AND DRITY I NED CLEAN HOUSE ALL THINGS .....

25 Teacher: Cathy do you have to vacuum, wash windows, and things like that ??

28 **Cathy:** YES I WAS ON THE WINDOW YES ALL HOUSE CLEAN ON SATURDAY LAST SATURDAY I CLEAN HOUSE FINSHED .....

39 **Cathy:** I SHOWER FINSH THEN CHANGE MY CLOTHES THEN I BREAKEFAST FINSHED THEN I CLEAN MY BEDROOM AND DISH ANFINSH TV AND COMPUTER AND TABLE THREE FINSH I CALLED TO MY FRIEND THEN I LUNCH FINSH THEN I WATCH TV OTHER FUNNY SHOW FINSH ,,,, THAT ALL

40 **Teacher:** OK Cathy Did you watch all that news this weekend about the oil spill in Iraq?? What do you think will happen to all the birds and fish ??

41 **Cathy:** NONONO I NOT SEE TO ON NEWS NO

Mary answered the teacher's questions about the war in Iraq (after the teacher persisted), not really elaborating on any one point but mentioning various aspects of the war (the water was bad, fish and birds died, many people, including children, were murdered).

Mary

5 **Teacher:** Mary - did you watch the football game

9 **Mary:** ...I NOT SEE FOOLDALL NO NO . I SEE NEW KIDS ON THE BLOCK JORDAN KNIGHT....

12 **Teacher:** Mary Did you watch any news this weekend ?

20 **Mary:** ...I SEE ON TV NEW KIDS ON THE BLOCK .. MY SISTHER SEE GO TO VIVST MY YOUR HOUSE. ' GUY NEIXT DOOR'

23 **Teacher:** Mary I do not want to talk about the new kids on the block right now please answer my questions!

26 **Mary:** ...I SEE TV SEE WAR IN IARQ . OLD WATER TO IARQ,,,

27 **Teacher:** Mary what happened to the water in Iraq??

30 **Mary:** ...I SEE IN WAR IRAQ ALL MANY IN WATER DIE BECAME OIL KILL FISH BRID ALL DIE.....

35 **Teacher:** Wow Mary You did watch what happened in Iraq!!! What do you think will happen?? How will they clean it up ??

43 **Mary:** ...VERY BAD IN WAR IN IRAQ ALL MANY WAR KILL HURT IN IRAQ. KILL IN WATER DIE FISH. TV VERY SAD WATER IN FISH. MANY PEOPLER AND CHILD AND KID ON TV IN WAR IRAQ VERY BAD .....

47 Teacher: Mary do you know anyone who went to Iraq ??

49 Mary: ...WAR IN IRAQ. KILL PEOPLE HURT IN WAR IRAQ VERY BAD LIKE NOT IRAQ ....

In contrast to Cathy and Mary, William struggled to answer the questions the teacher asked him, wrote brief contributions, and never did understand or answer the questions.

William

2 Teacher: William - What did you like best about the football game? Did you want the Giants to win?

4 Teacher: William - What did you like best about the game ?? Did you want the Giants to win?

8 William: YES WIN GIANTS . BULL WON 17 [The Giants won. The Bulls made 17 points.]

33 Teacher: William you still have not answered my question. Who did you want to win the game?? Did you want the Giants to win or the Bills to win ??

37 William: GIANTS WIN 20. BULL WON 17.

38 Teacher: William who did you want to win the game ?????

42 Teacher: William I know who won the game but who did you want to win ??

44 Teacher: William Please type and stop talking !!!

45 William: BULL WON 17 , GIANTS WINNER 20.

Ali seemed to struggle to write anything at all (she had only three turns in the entire session), and she built her turns almost entirely on those of the other students (the text in bold print shows where Ali mimics Cathy's and Mary's texts). In her fieldnotes for that session, one researcher wrote:

> *Ali's still struggling with her part, and it seems she hasn't sent out her message yet. I can sense her uneasiness since everyone is sending out messages.*

Ali

3 Teacher: Ali What did you do this weekend ??

13 **Cathy:** NONONO I NOT SEE TO NEWS BUT I HAVE A BUSY I WATCH TV NEW KIDS ON THE BLOCK YES..BEACSUE I HAVE BUSY CLEAN HOME AND TDD CALL TO FRIEND THINGS THAT ALL

17 **Ali:** ali watch on t V NEW KIDS ON BLOCK

[Other students have also said in their turns that they watched New Kids on the Block]

18 **Ali:** JOE I YOU LOEV [Joe is a member of the group, New Kids on the Block]

21 **Teacher:** Ali You love someone name Joe ??? Well any way Please answer my question

26 **Mary:** ...**I SEE TV SEE WAR IN IARQ . OLD** WATER TO IARQ,,,

30 **Mary:** ...I SEE IN WAR IRAQ ALL MANY **IN WATER** DIE BECAME **OIL** KILL FISH BRID ALL DIE.....

31 **Ali:** I SEE TV WAR IN IRAQ OIL

36 **Teacher:** Ali What happens to birds and fish in all that oily water ??/

49 **Ali:** I SEE TV IARQ IN WATER OIL OCEAN

It is clear that even though this small class of four students was involved in the "same task," writing on the network together, each student approached that task very differently, and the teacher was challenged to interpret what they were saying, respond appropriately, and write in a way that encouraged them to write more. The extent to which she was successful, with different students, is a topic for considerable discussion, making this transcript a rich example for use in staff development workshops for teachers learning about network interaction.

Conclusion

As often occurs with educational approaches, there is a tendency to characterize network interaction according to one's own experience with it, as if the qualities one observes are experienced by everyone. We have heard such contradictory comments as:

- "ENFI conversations are simple and superficial. Students just play around."
- "Students are more motivated to write on the network, and they write better."

- "Students take network writing more seriously, because they can finally write things they want to write."

We have attempted to show here that network writing in itself doesn't *have* particular qualities. Rather, its qualities are shaped by many factors related to the contexts in which the writing occurs. When teachers understand these factors, they can play a positive role in shaping what the qualities of the writing will be.

Interactional Scaffolding in Network Conversations

Parents, teachers, and language researchers have long understood the importance of interaction in learning a spoken or signed language. This learning takes place when a more competent user of the language interacts with the language learner in a supportive conversational context (for example, a parent, other adult, or older child with a young child learning a first language, or a native speaker with a non-native speaker of a second language). The more competent language user facilitates the interaction by accepting the learner's utterances as conversational contributions and responding to them; modeling the correct use of the language; and "scaffolding" the interaction, providing language props that will help the learner move to a new and more advanced level of language use (Bruner, 1975; Cazden, 1981, 1988). This scaffolding can take several forms, including:

- modifying one's own language, so the learner can understand it;
- asking questions to help the learner have something to talk about or to prompt the learner to elaborate;
- repeating and rephrasing the learner's utterances;
- using new words that are understandable to the learner in the conversational and social context, and that the learner can then use; or
- requesting clarification, and thus encouraging the learner to rethink and restate ideas.

Teale (1982) expands this understanding of scaffolding to include literacy learning. He claims that "literacy comes about as a result of the ways children interact with adults in problem-solving situations that involve reading and/or writing," and that these "literacy interactions ...lead the child to internalize aspects of reading and writing and eventually to understand how to use them independently" (quoted in Lehr, 1985, p. 668).

We have seen this scaffolding and language modeling taking place, in network writing and in network-related discussions held in sign language, in almost every ENFI classroom we have observed. We believe, therefore, that network writing provides a promising context for deaf students to acquire written English. As they engage in purposeful, interesting conversations, using the English they know, they continually receive feedback about what they have written. Also, as demonstrated in many of the examples in this chapter, the students' sign language is used to support their efforts in network writing, making ENFI an excellent strategy in a bilingual program. Furthermore, students also receive a rich blend of English from the written contributions of the other participants on the network that they can make use of and build on.

Network interaction has provided many and various types of scaffolding — on the network itself as the students wrote, off the network as they conversed with others in sign language about what they were reading and writing, and in follow-up sessions, conducted primarily in sign language. As the examples in this section demonstrate, the scaffolding did not always lead to changes that were immediately visible in the students' use of language, but often it did.

Scaffolding on the Network

In transcripts of the network writing, we saw numerous instances of language scaffolding. Sometimes this took the form of direct modeling of particular English words, spellings, structures, and accounts. It also took more indirect forms, such as the use of questions and comments to elicit more writing, to focus students' thinking, and to develop their problem solving skills.

MODELING VOCABULARY

At times, the teacher simply supplied the correct word for one the student had attempted.

Jessica: Hi Teacher, yes I want a nailpanit kind of pink . . .

Teacher: Jessica, do you mean fingernail polish?

Jessica: Oh yes, Thank you.

Not all language modeling was as simple as this example, especially if the teacher didn't know what the student meant by a particular word or phrase. The following interaction shows a lengthy negotiation between a teacher and a Special Opportunities Program student, in which the teacher had to figure out what the student's phrase "title sister and title brother" meant before she could provide an appropriate language model (the student's and teacher's use of this phrase is highlighted for the purpose of illustration).

Cathy: good morning. how are you ? I AM FINE .. I A,M HAPPY WITH EVERY-BODY .. I AM SORRY TO YOU BEACUSE MY BESR FRIEND AND **MY TITLE SISTER AND TITLE BRITHWER** OKAY I VERY SIORRY OKAY I WENTTO STORE NAME FAR HECHT'S AND WOODOIES IN MAYLAND YES I HAVE FUN WITH MY MOTHR OKAY I AM HAPPY ,.....!!!!!!!!!!!!!!!!!!!!!!!!

Teacher: Cathy I am happy that you are happy!!!!!!!!!!!! The stores were in a mall? Were there many other stores? Why are you sorry about ***little brother and little sister***?

Cathy: OKAY OKAY **TITKLE STORY SISTER AND BRITHER** OKAY .. I CHAT WITH MARCIE AND JOY TALK ABOUT THING DOING TO WEEKED I CHAT LONG TO JOY AND MARCIE I HAVE WITH STORY **TITLE SISTER AND TITLE BRITHER** ... I FEEL HAPPY WIOTH MY BEST FRIENDS I HAVE FUN AND CHAT I LIKE TALK-ING LONG LONG TIME ... I AM SORRY OKAY OKAY HAPPY WITH MY BEST FRIEND OKAY

Teacher: Cathy did you read a story named ***"Little sister, little brother."*** I do not understand.

Cathy: NOT FINSH OKAY .. IS SEE TO FEAD WOMAN AND MAN OKAY THAT GALLUADET..... OKAY NONOONNONOONONON I SAY **TITLE SISTER AND BROTHER** GOOD FUN AND TALKING CHAT LONG MEANS **TITLE SISTER AND TITLE BROTHER**

Teacher: Cathy are you trying to spell little-not title.

Cathy: SOME PEOPLE DEAF IN STORE I WALKING TO STORE THEN I WAS TO DEAF WOMAN AND MAN ... BUT **MY TITKLE SISTER AND MY TITLE BROTHER** THAT JOY AND MARCIE OKAY .. DO YOU UNDERSTAND TO ME ???????

Teacher: Cathy so you mean that you like to call Marcie and Joy your brother and sister? They are good friends like brother and sister?

Cathy: YES BUT **MY TITLE SISTER AND BROTHER** YES BUITI **LIKE BEST FRIEND AND BROTHER AND SISTER** OKAY .... I ENJOY FRIENDS OKAY OKAY

Teacher: Ok Cathy now I understand. Before I did not understand "title." The best way to say it is **"Joy and Marcie are like my brother and sister."**

As those who know ASL will realize, one might sign quotes before brother and sister to mean "like my brother and sister," and Cathy has confused this with the English gloss "title," which is often assigned to that sign.

MODELING SPELLING

In this example Vincent is explaining that his family, who are hearing, know very little sign language. Again, the word the teacher models for Vincent is highlighted.

Vincent: . . . I know now well my family all no deaf here so but litle **sing** too but I ask follow hard understand **sing** about I want go eat McDonald. . . .

Teacher: Vincent you said your family knows a little sing. Sing means to use your voice with music. You mean your family knows a little sign! Right?

Vincent: ohhh okk well my family not sing so sorry well my family **sign** right

MODELING A NARRATIVE

Language modeling or scaffolding doesn't have to be confined to specific spellings, words, or structures; rather, an entire narrative or account can be modeled by the teacher. Here, a class was discussing what they did in science. Different students provided different accounts, some more and some less thorough. Then the teacher gave her own account, building on what the students had said and modeling the correct way to say it.

Teacher: Good morning class!!!!! Let's talk about what we did in Science yesterday, okay?

Robert: ...crayon with wax paper then sun after that then look pretty ??right??

John: first put waxpaper andput color another waxpaper and iron and melted and dry for five sec gule on paper and dry then on window then sun look pretty are i right?

Tammy: I made Science of the leaves maybe today for small two leaves

Teacher: John, Wow, yes, you are right!! We put shaved crayons on wax paper then we put another sheet of wax paper over the crayon pieces. We ironed the crayon pieces. The crayons melted. We then framed the melted crayons in a leaf frame.

PUSHING FOR ELABORATION

Scaffolding on the network also moved beyond providing a direct language model. Teachers also asked questions to encourage students to expand on their original contributions, as in this discussion of Mike's project for the science fair.

Mike: ...i want science fair i want a soda project ok ..

Teacher: Mike, that's a wonderful idea about doing something with soda and it is a liquid too. [Another student had said she wanted to do a project with liquids.] Is there something you want to know about soda?

Mike: ...this soda have many different kind of name soda then check many have soda of score and point .. then go down stair to class then i will tell to student many count for soda.. . . . My soda title is "wahty your prafec of kind soda for K.D.E.S."

Teacher: Mike, that would be interesting. What soda do you think would be students' preferred drink?

Mike: I think student like a Pepsi..

PUSHING STUDENTS TO FOCUS ON A PARTICULAR TASK

In a problem-solving session, another teacher asked the students how they might help a student who had cheated on a spelling test to get ready for future tests. As we can see in this excerpt, one of the students suggested possible punishments rather than giving advice. The teacher repeated her instructions to help them focus on that task.

Teacher: How should the boy get ready for the tests? What can he do so he does not need to cheat?

Linda: He must get a policy hat or give him a F.

Teacher: Linda, what is a policy hat??

Linda: Those school have a policy hat it looks like a sit in the coner you know.

Teacher: Please give the boy some ideas to use for studying so he will not have to cheat. Remember the boy says he gets nervous when he has to take a test.

Linda: He need to review his work, prctice and studing the words until he remeber.

Teacher: Linda, those are some good ideas!

DEVELOPING STUDENTS' MATH LANGUAGE, PROBLEM-CREATING, AND PROBLEM-SOLVING SKILLS

The following is an example of how a teacher led two students, who were at two very different places in their understanding of and ability to use math language, to express two math skills correctly. With the help of the teacher's prodding and the teacher's and other students' modeling, Dennis moved from a skill he had already mastered (writing number sentences) to a new one (writing a story problem). Steven moved from misunderstanding and non-participation to the ability to perform one of the skills — writing a number sentence.

Because so many dynamics occur here at once, the relevant student and teacher modeling and student performance are described in brackets. Turns in the conversation are numbered to show where turns have been extracted from the entire interaction.

[*The teacher introduces the topic and number sentences:*]

1 **Teacher:** Hi everyone! Well, I'm glad we are all on ENFI now! Please explain to me what a number sentence is.

11 **Dennis:** You tell me a example.

12 **Cher:** SUZANNE FAST TO WALK 30 MILES DENNIS FAST OR LESS 01 MILE FOR WALK.

13 **Teacher:** Cher gave an example of a story problem. What would be the number sentence for her problem?

14 **Timothy:** 30-1=H

or F

or A

[*Dennis shows that he knows how to construct a number sentence:*]

16 **Dennis:** 30-1=z

[*Steven offers no answer to this problem.*]

17 **Teacher:** Dennis and Timothy are right!

[*The teacher gives an example of a story problem from which to construct a number sentence:*]

33 Teacher: Let's say I have $10.00, and I want to buy a toy that costs $5.50. What would the number sentence be that will help me know how much money is left?

34 Steven: 15.50

35 Teacher: Steven, what is the number sentence?

36 Steven: addd

[*The teacher restates Steven's answer as a number sentence:*]

37 Teacher: So you mean 10.00 + 5.50 = n?

38 Steven: I am forget

[*Again, Dennis writes a correct number sentence:*]

48 Dennis: 10.00-5.50=z

49 Teacher: Dennis, that is excellent! Now I would like for YOU to make up a story problem.

[*Dennis constructs a correct story problem:*]

59 Dennis: joe collect 500 football cards and mary collect 38 football cards how many more joe than mary?

63 Teacher: That is an excellent problem that Dennis wrote. Who can think of the number sentence for his problem?

[*Steven gives the correct number sentence:*]

67 Steven: 500-38=n

71 Teacher: Steven and Harvey and Cher are right!

Scaffolding Off the Network

Advocates of bilingual programs for deaf students stress the importance of using students' strongest language (often ASL), with which they are more familiar and comfortable, as the basis for developing their proficiency in a second language, written English. As Bouvet (1990) argues,

> *Sign Language allows deaf children to be received in terms of something positive, namely their marvelous ability to express themselves in a visual mode. . . . When deaf children are recognized as linguistic beings and afforded visual speech in a positive atmosphere of communication and accomplishment, they acquire [language] naturally. (p. 235)*

Even after a long period of time writing on the network, many students didn't feel as comfortable communicating in writing on the network as they did in sign language. The use of sign language to support and build on the network interactions allowed them to use what they knew and felt comfortable with to work toward what they didn't know as well.

During ENFI sessions we observed many instances of the use of sign language to support the writing. One of the researcher's (Anne Marie Baer's) fieldnotes are filled with descriptions of her and the other students interacting in sign language to help students understand the messages appearing on their screens and then proceed to compose their own messages. For example, on 1-28-91 she wrote,

> *Sally signed out Leslie's [the teacher's] first message. Then she asked me what "Gulf" is [the teacher had written something about the war in the Persian Gulf], and I used classifiers [an ASL construction] to illustrate the continents of Iraq, Kuwait, and Iran and where the water flows in. . . . Jane asked Linda off the screen to spell "forget." Linda spelled it and then signed two roots, "for" and "get." Vincent asked Linda off the network how to spell "steal." Mike joined in but spelled it incorrectly. I spelled it and told him it's present tense. The past tense is spelled "stole." Vincent wanted the present tense. Sally asked me how to spell "video-tape" . . .*

In follow-ups to the ENFI sessions some teachers used the printed transcripts of the discussions to further refine, correct, and elaborate on — usually in sign language — what the students had written. When on-network and off-network scaffolding were combined in this way, the students had multiple opportunities to think about their language use, and the teachers could correct errors and misunderstandings that were missed during the network conversations. For example, the following shows the complex ways that William's network writing was scaffolded both on and off the network, both during and after the ENFI session (turns are numbered to show where this interaction has been excerpted from intervening turns).

3 Teacher: Good morning William what did you do on saturday?

6 William: on saturday to my father birthday

7 Teacher: William did you have a cake for father?

8 William: wrong

11 William: yesterday birthday to my father oct 14

13 Teacher: William oh your father's birthday is on sunday not saturday...

18 William: no saturday and wrong throught birthday

50 Teacher: William, last night Oct. 14 you had cake for dad's birthday?

[Anne Marie wrote in her fieldnotes, "William asked me how to spell 'delicious,' which I did."]

51 William: big cake eat delicouslike cake wow?

54 Teacher: William what kind of cake? Chocolate?

["William asked me to interpret the teacher's question about the cake. I signed it out in ASL and he answered 'No! Vanilla!' I told him to answer that. I helped him spell 'vanilla.'"]

60 William: no chocolate i like chocolate and yes ilike vanilla and cake

In writing and in sign language, the teacher and Anne Marie helped William, who was a Special Opportunities Program student, to express himself and tried to clarify what he was saying. A follow-up to the network session provided another opportunity to clarify this conversation. The class looked at the transcript and discussed William's answer in line 8, "wrong." Students said they didn't understand what he meant by that, and the teacher asked William to say more about it. William explained that he had had a birthday party for his father on Sunday, not on Saturday, he had been wrong when he said it was Saturday. The teacher wrote on the board an alternative way of expressing this idea:

Father's birthday was on Sunday, not Saturday. I was wrong.

Another example comes from Mary's interactions on and off the network in the same class. On the network, Mary never did pick up on the teacher's model for how to say "husband."

35 Mary: heather [the teacher], this kown i like feel your wife father what your name;

38 Teacher: Mary are you asking my name?

43 Mary: me kown don't wife father name,,,,,,

48 Teacher: Mary . . . do you want to know my husband's name?

53 Mary: haether i mad with you baby sarh jilao

56 Teacher: Mary!!!! Let's not talk about Sarah yet. I asked you a question, do you want to know my husband's name?

63 Teacher: Mary, do you want to know my man's name?

Mary didn't answer the teacher's questions, she didn't see that by "wife father" she meant to say "husband," and she eventually started writing about another topic. But in the follow-up session off the network, the teacher was able to focus on this again. She wrote on the board:

Mary: i like feel your wife father what your name

Heather, what is your *husband's* name?

Heather: Mary, my husband's name is Gabriel Jilao

Wife is Heather Jilao

Husband is Gabriel Jilao

Girl (daughter) is Sarah Jilao

Then she explained that she and her husband have the same surname and showed the class pictures of her family.

Some teachers worry that students will not learn the conventions of standard written English if they are allowed to write incorrect English on the network. However, student "errors" can give teachers important information about how students are processing and using English and can provide opportunities for rich discussions about language use. In follow-up sessions, the class can edit the transcripts together.

Teacher: hello everyday! how are you ????? i look at yer evereasch loo tired!!!!

For example, one teacher wrote on the board a student's first line of a network conversation: The student was playing the role of "teacher" that day, which involved asking the other students questions, continuing conversations with them, and modeling language for them. Taking this role was itself a scaffolded behavior. The student took on the role halfway through the school year, after the classroom teacher had modeled these behaviors in many network sessions.

In the follow-up, the teacher changed "everyday" to "everyone," and the class agreed that the change was correct. They agreed that "how are you!" was correct. They then agreed that "evereasch" should be "everyone," and the teacher changed it on the board. She then told

them that each sentence should begin with a capital, and one student made the changes on the board.

In another session, the teacher used the same transcript to discuss what constitutes an appropriate response. She wrote on the board Ali's response to the "teacher's" question:

Teacher: hello everyday! how are you ????? i look at yer evereasch loo tired!!!!

Ali: I WITH BOYTHER FIGHTS please SOTP YUO BOYTHER

She said to Ali, "Cathy was asking you how you are. You answered" (and pointed to the line on the board.) Ali said, "I goofed" and, in discussion with the teacher, wrote on the board, "I feel fine." This discussion yielded a rather immediate and visible result. In the next network session, Ali did reply appropriately to Cathy's question:

Cathy: hello ali. how are you ???? i feel whoops today frist time today!!!! what you doing weekend and taking about friend weeknd of ??

Ali: SAT I BOOK READ " CRZAY FOR YOU" LONGED GO ROOM dEB SLEEP TIRED MY WEEKEND

A final example shows that a small bit of network writing can be the springboard for a considerable amount of expanded discussion in sign language afterwards. In the network session in which Ali, who had very limited proficiency with written English, wrote:

Ali: I WITH BOYTHER FIGHTS please SOTP YUO BOYTHER

Cathy, acting as teacher, tried to get more information, but Ali was able to provide very little elaboration on the network:

Cathy: ali please again i not understand of your answer okay you need senctnce!!!!!!!!!!!!!!!!!!!!!!!! . . . ali please you answer of me now !! what means your brother fight with you what means . so when you fight wiht your brother ???

Ali: I MAGAZINE READ BUT MY BROTHER TOOK IT I GOT MAD MY BROTHER FAULT MY BROTHER FIGHT WITH ME

In the follow-up session, the teacher wrote Ali's first turn on the board, asked her what she had written, and the following signed discussion ensued:

Ali: Friday I was with my brother who kept fighting with me. I told him to stop.

Teacher: You and your brother fought?

Ali: Yes.

Teacher: You wanted him to stop?

Ali: I stopped my brother. I'm tired of it.

Teacher: You are tired of your brother fighting with you. Why were you both fighting?

Ali: Really I did not know. When my sister and my parents went out, my brother was home with me. I was real tired. My brother tried to do something but quickly backed off. Then he started physically fighting with me. I asked him to stop. [giggling]

Teacher: So you mean you were relaxing — sleeping — and your brother kept on tapping on you. You told him to stop but he kept on tapping on you?

Ali: (Nods affirmatively.)

Teacher: Oh I see. Were you mad?

Ali: (Smiling.) Yes.

Teacher: Did you hit him back?

Ali: (smiling) Yes.

Ali's one line of print on the network generated a signed conversation in class in which her knowledge and language skills were honored and she could elaborate on what she had written. This signed interaction could easily lead to another network discussion of this topic, and the discussion could continue from session to session, moving back and forth between sign and print, elaborated on and extended each time.

Building Competence through Conversations

In this section we have shown the many different opportunities that network writing provides for scaffolding students' written English. Both on the network in writing and off the network in sign language, the teacher, the research assistant, and the other students in the classes accepted and built on the students' written attempts. This often took the form of direct corrections of specific vocabulary and word spellings, but it also included eliciting and providing elaborations on topics and providing examples of different writing styles and ways of thinking. In short, there were multiple opportunities to correct and extend the students' competence, in writing and in thinking.

Conclusion: Language Development on the Network

Do ENFI activities facilitate changes in students' network writing? In response to this question, information about student development was collected as part of the Teaming with Text Project (TWT). The data were collected in a variety of ways, including observations of network classes, analysis of transcript samples, teacher conferences, interviews and focus groups, and student interviews. Based on the information collected, we were able to document examples of language scaffolding, as described in the previous chapter, as well as changes in individual students. The information also contributed to the development of profiles of six Kendall school students, demonstrating changes in their progress over the school year.

In answer to the question above, we found that ENFI interactions do facilitate the development of network writing for deaf students in a variety of ways, some of them attributable to the concept of scaffolding. Some of the scaffolding is immediately observable in a dialogue, such as the specific language modifications made by a teacher in response to a student's contribution. Other examples are less easily observed, but nonetheless influential, such as teachers' scaffolding of *activities* over the long term to suit students' changing linguistic needs. In this final chapter we give examples of changes in students' development and reflect on what we know about network interactions and language acquisition.

Development of Student Writing

Data collection during the TWT Project focused on communicative interactions the students were involved in during network activities and how their network writing, including features

of pragmatic communication, changed in these contexts over time. This perspective is in keeping with social interaction theories of language acquisition (Bohannon, 1993) that promote functional, communicative language use as a precursor to language structure development.

The six Kendall School students profiled were chosen by their teachers for more in-depth analysis because of the range of skills they represented. As Special Opportunities Program (SOP) students, these students were not functioning at the same academic or social levels as their deaf peers for a variety of reasons, including developmental delays, communication problems at home, previous educational experiences, or at least one educationally significant disabilities. These students seemed to depict the range of abilities within that department, according to their teachers. Their profiles, created with teacher collaboration, describe changes in their development over the course of the TWT project.

In general, by the end of the project, we could say that these six students were:

- more confident in writing on the network and more motivated to participate in the interactions than they were at the beginning of the year.

- more engaged in the discussions on the network — with the teacher and with each other — writing more extensively on shared topics, asking and responding to more questions, seeking and providing clarification, and elaborating on their own contributions to make them more clear to others.

- more independent in writing on the network than they were at the beginning of the year, needing less encouragement and sign support for their network writing.

For all of the students it seemed that the network writing developed and reinforced some important conversational skills in written English, like initiating topics, staying on topic, requesting and providing clarification, elaborating, and asking and responding appropriately to others. Beyond that, individual development varied, of course, according to the abilities of the students. Also, the development of their writing on the network was clearly influenced by the teachers' sensitivity to individual needs.

One of the teachers in the TWT project, Heather, described her students at the beginning of the year as confused about network writing (for example, who was saying what, who was addressing whom), afraid to take risks, and in general much more tied to signed than to written interaction. In response, Heather initially structured the network interactions so that she carried on individual conversations with each student, even though they were all on the network together. Over time, her students became more comfortable using written English, discovering that they could use the network, and the language, as another way to communicate. William, one of the six students studied in detail, demonstrated the most dramatic changes among the students in Heather's class.

William

At the time of the study, William was 12 years old, profoundly deaf, and had minimal signed communic ation at home. He was in a class of students functioning far below the other Kendall middle school students, due to a variety of learning problems, including poor memory retention, short attention span, social immaturity, and low motivation and self esteem. In school, he demonstrated adequate social communication skills with American Sign Language, but was reading around a first grade level. William had little confidence in his ability to comprehend written text.

At the beginning of the year, William had difficulty writing on the network and made only three- or four-word contributions. He often missed the point of what others wrote to him, and the reader needed a lot of contextual explanation to understand what he was writing. The following excerpt from an early transcript gives an indication of the brief writing that William did and the prodding the teacher had to do to elicit it. (This conversation, as with the others shown below, was interspersed with other contributions from the students and the teacher.)

10-11-90

William: heather how are you feel and fine

Teacher: Hi William, I am doing okaybut I am tired. so, is Marcie your girlfriend?

William: my grilfirend cathy

Mary: william do have sis . do have bor my father wife mother

William: no

Teacher: William thank you for answering my question!!!!! so cathy is your girlfriend that's nice.

William: thank heather

Teacher: William, sure—anything. i like to help you!! Last night did you watch TV?

William: yes

William: plaece water

Teacher: William it's PLEASE not plaece, no water now. Answer my question please. Last night did you watch TV?

William: football

Teacher: William, what were the names of football teams?

Teacher: William, you did not answer my question, what is the name of the football team?

William: yesterday football

(The session ended at this point.)

By the end of the year both Heather and the research assistant observing the ENFI sessions felt that William was making more of an effort to write on the network and to understand what others were writing. He used a wider range of vocabulary, responded more to questions, asked questions, and continued topics from turn to turn. He no longer seemed afraid to use the vocabulary that Heather believed he had inside him all along. She observed him writing notes to friends and to his parents (who often wrote with him to communicate), and helping other students on the network (he often spelled words for Ali, a classmate who also had problems with written English).

The following two excerpts from later in the year show William giving accounts of his weekend activities, responding to requests for clarification and elaboration, and continuing topics in response to questions. (At this point Cathy, a student in the class with higher English proficiency, was acting as "teacher" along with the classroom teacher, Heather.)

2-29-91

William: MY WEEKEND ,SATURSDAY REST LEG HURT SOLLEN. YESTERDAY , I AM TRIED ME AND HURT LEG, YESTERDAY REST.

[*Off the network he had signed to Heather,"My leg was swollen, specifically my knee was swollen, how do I spell that?" Heather and the research assistant spelled "swollen" for him.*]

Cathy: I NOT UNDERSTAND OF YOU .. WHAT YOU TALKING ABOUT? WILLIAM.

William: MY WEEK. WHAT ABOUT TALK. CATHY UNDERSTAND ME.

William: I BORED ABOUT WEEKEND PERIOD.....ON SATURDAY ME REST HURT LEG SWOLLEN MY LEG HURT . NEXT NOW , YESTRDAY I AM TRIED ME

Cathy: WILLIAM I UNDERSTAND OF YOU ...BETTER YOUR LEG FEEL BETTER ?????

William: YES YES YES YES YES FEEL LEG

Cathy: WILLIAM..YOUR LEG CAN WALKING?????????????

Teacher: Cathy I think William is an old man !!He is always talking about hurting!!!!!!!!!!!!!!!!

Cathy: HEATEHR HE SAY HE LEG HURT NOW FGEEL BETTER..

William: I LITTLE CAN WALK. NO RUN BECOME SWOLLEN.

5-6-91

Teacher: William what did you see on tv aboutthe people mad at the police?

William: yes heaed news fight people and police. many people crowd fight police . some police hurt .

Teacher: William you are right. The people were very mad at the police. do you know the reason that the people were mad at the police?

William: I SAW ON TV . YES MAD POLICE CALL MAD PEOPLE ROCK CAR.

Teacher: William do you think the people were right or wrong? do you think the police were right or wrong?

William: I THINK WRONG PEOPLE. I THINK POLICE RIGTH.

Teacher: William why do you think the people were wrong? Maybe they were frustrated.

William: WHY PEOPLE ROCK TO POLICE.

Teacher: William it is a long story and it is time to go. I will tell you more about the story when we go downstairs.

William still had a long way to go at the end of the year in terms of effective communication in print. However, during the year on the network he made tremendous progress in terms of communicating on an equal basis with other students and the teacher, expanding on his own messages so they could be understood, and even initiating interactions with others.

William's progress was due not only to the dynamics of the network interactions, but also to Heather's sensitivity to his level of development and her tailoring of the network activity to his needs (for example, answering questions about his weekend through a one-on-one interaction with her or another student acting as "teacher"). With William and his classmates, this activity worked well all year long. In other classes, the activities changed considerably

over time as the teacher adapted the network experiences to students' changing needs and abilities.

In some cases, too, it became evident that a student had outgrown an activity that still functioned well for the rest of the class. For example, Leslie, another Special Opportunities Program teacher, wanted her students to use the network to develop their problem-solving skills to improve their ability to function effectively at home, at school, and in their community. Her students were more experienced with network writing and were more proficient with written English than Heather's students. Leslie wanted the students to recognize and understand a problem statement when it was presented in sign language and in writing, to be able to clearly state a problem, propose logical solutions to a problem, and respond appropriately to others' contributions to problem solutions.

In the beginning of the year Leslie presented simple, hypothetical problems concerning matters of communication to the students, asking them how they would respond in such situations. The questions seemed almost too simple, however, and the students were not sure about what was expected of them. Contributions were short and directed mainly to Leslie who had posed the problem. Gradually, it became clear that the activity was more effective if the students suggested the topics themselves, resulting in problems and issues that were more relevant to their own interests. The discussions became more focused and the interactions among the students, on the network, became more extensive and dynamic. Again, the teacher's sensitivity to the needs and abilities of the students added to the success of their network experiences. Within this instructional context, changes in Leslie's students became apparent. Sarah's progress illustrates how the network activities can, and should be, modified as students develop.

Sarah

Sarah was 13 at the time of the project and the most proficient reader and writer in Leslie's SOP class. She had used ENFI the previous year, and she also had much better communication, as well as academic and social support from home than did William. Her hearing family signs with her, they have traveled a great deal, and her parents place great emphasis on learning to read and write well.

Even at the beginning of the year, Sarah understood the activity and what was expected of the students. She understood the problems the teachers presented, understood that a solution was desired, and was able to provide reasonable solutions. She even added relevant information that was not asked for. For example:

9-27-90

Teacher: Your mother sent you to the store to buy milk. She wants chocolate milk. You looked and can't find it. You will have to ask for help. The sales clerk is hearing. How will you ask for help?

Sarah: Yes, She frsit ask for help and possbably to use asl or wirte paper. The sale clerk might became understand about that.

10-4-90

Teacher: You are at the school library. You can't find the book you want. You must ask the Librarian for help. What questions will you ask?

Sarah: I were at school libaray but I cannot find the book title "Coal" and ask the libaray help. I said "Where is title "Coal" and the libaray will help me show for wall books and can find for the book title "Coal".

Even when the other students wrote personal narratives instead of solutions to the problems, Sarah responded appropriately to the problems and proposed reasonable solutions.

Sarah gradually took on more responsibilities in the discussions. In January, for example, seemingly unprompted, she began several ENFI sessions with a question for the other students and followed up with those that responded, at times rephrasing what they wrote. For example:

1-23-91

Sarah: Hello everyone! How are you? I am fine. Why [what] do you think about three white men in Iraqi? Do you have any question?

Jane: yes , hi sarah , why beause that people from army that for war form iraqi yes but on yesterday on tv that man on iraqi tv man that for hurt yes that face form iraqi yes what happen hrut yes.

Sarah:)h hi Jane, Three white men were landed from air force and over iraqi. Iraqi caught three white men are getting hurt.

Vincent: Yes Hello Sarah, Well I wonder so becuse other Iraq bad other people big gun bring look plane than three man oh no plane bronk than three man jump out deep on grass floor than other many army bad get three man go in jail wait 8 hour? I wonder so too but I see your newspaper and too very sad three man.

Sarah: Hello Vincent, that's it and three white men in jail and wait until eight hours. I don't see them get hurt. it's too sad about this.

She also took the part of "teacher" in some ENFI sessions, presenting a problem for the other students:

3-4-91

Sarah: I have a problem with christina last two week I went over sleep christina's house but I forget my T-shirt "Bart Simpson" and white pant i just called her on tdd, christina's father told her return my clothes then i told her many time she always forget to bring my clothes.

She responded supportively to the solutions they offered:

Linda: Sarah, Suppose Christina bother u and you forces christina ' s parents.

Sarah: Linda, I will call christina's parents about return my clothes Maybe her parents mad at christina.

She prompted students who talked off topic to offer their solutions.

Mike: Dear jessica why you ask to me about linda some one pick on me why you tell me to ok.

Sarah: Mike, I don't know about that... Can you help for me?... what do you think solve problem?

Mike: Dear sarah but i can t help with you ok.

Sometimes Sarah introduced new vocabulary on the network that had not been part of the discussion, but that the students then began to use on the network and the teacher used for discussion in a follow-up session:

3-18-91

[The class was discussing a problem the teacher had introduced related to going to the dentist.]

Sarah: Hello everyone, When you go to the dentist? Or when you go to the orthodontist?

Sarah introduced the word orthodontist, which then became part of the discourse among the classmates.

Essentially, by early spring, Sarah had accomplished Leslie's goals for network writing with this group, and had progressed beyond the other students. (At the end of the school year Sarah left Kendall to enter the regular program at the Model Secondary School for the Deaf; the other students in the class made this transition the following year.) The challenge for Leslie

at this point is what to do with this student—how to interest and challenge her and move her along further. Interestingly, by late spring, Sarah was easily and proficiently accomplishing the tasks the teachers presented, and then going on to "chat" with other students about other things, drawing other students away from the original focus of the activity. For example,

4-29-91

Teacher: There was a spelling test with very hard words. A boy in the class wrote some of the words on his hand, and the teacher saw it when he was tying his shoelace. She said he was cheating. The boy said that he did study, but he gets nervous in tests and didn't want to forget the words. How should he get ready for tests? What can he do so he doesn't cheat?

Sarah: I have a good idea. I help him to do homework for study spelling words or he try to ask his parents for help.

Teacher: Sarah: Yes, of course! How could you help him??

Sarah: I can share with him to do hoework for study spelling words or explain about spelling words. Quiz on firday.

Teacher: Great!!

From this point on in the transcript, the teacher continued to discuss with different students their solutions to the problem, while Sarah attempted to initiate conversations with different students about their weekend ("Hello Mr. Dangerous, Do you have a fun a weekend?" "Angus and you went to the carvinal. How long stay at carvinal?"), TV shows ("I finished watched TV show Flash last Satursday."), or anything ("Jessica, what's up?"). She might have been bored and looking for something to do, or she might have decided that since the other students were not going to write on her level, she might as well write on theirs.

Leslie's challenge is one that many teachers face—what to do with more advanced students who have moved beyond their classmates. Possible next steps with a student like Sarah might be to ask her more often to present problems on the network, to summarize and respond to different students' proposed solutions, or even to lead preparation and follow-up sessions, using the transcripts. Or she might have been placed with a different, more advanced group of students for network discussions, where she would be challenged and interested. Whatever the next steps, it is clear that Sarah was ready to move on to more advanced work.

As William's and Sarah's progress demonstrates, the types of changes students made in their writing on the network were tied, in part, to their levels of proficiency with written English at the onset of the project. The network interactions, plus the teachers' ability to modify activities according to individual needs, appeared to successfully scaffold students' development to higher levels. The profiles enabled us to see the extent and nature of individual

progress after a year on the network, and how it varied from student to student within this select group of students.

It is important to note that network writing did not represent all of the reading and writing that these students did in English during the time of the project. Network writing is produced without additional drafting, which would provide opportunities for further reflection and revision. Many of the students were able to, and did, write more focused, extended texts with proper capitalization and punctuation, in other contexts. Network writing is *one* valuable kind of writing, among many others, that students need to be involved in. It appears to promote language development in ways that are unique, due to the nature of the electronic medium and the dynamics of the interaction.

Acquisition of Language and Literacy on the Network

How network interactions facilitate students' development can be addressed by looking at what we know about the electronic medium itself and theories about language and literacy learning.

Trent Batson, co-director of the TWT project and a developer of ENFI, describes the unique contributions of network interactions as an instructional tool as follows:

- Conversations on the ENFI network can be psychologically freeing—a real-time discussion with people in the same room but without the normal rules of conversation. Many times this results in less inhibited communication.
- ENFI has characteristics of both face-to-face conversation and traditional written communication but is different from both.
- Participation on ENFI tends to be more equally distributed between students and teacher than traditional class discussions in which the teacher dominates.
- ENFI makes the audience and purpose of the writing obvious and present.
- Writing grows out of social interaction on the network.
- ENFI gives students the opportunity to "play" with language on the network.
- ENFI slows things down—which enables some students to participate with less difficulty than in oral conversation in English, and can encourage reflection.

- ENFI requires writers to build context with print to make possible the reader's comprehension of their message.

Many of Batson's observations about ENFI touch on concepts about whole language: the social aspects of language use, the importance of audience and purpose, and the building of context for one's audience (see "ENFI in Context: Deaf Education, Whole Language"). We have discussed in this book how language scaffolding is inherent in the participatory, interactive nature of ENFI activities. These concepts are based on current theories of language acquisition and related theories of literacy development that are demonstrated in ENFI activities. We conclude with the following summary of some of these theories and their application to network activities, based on the work of Stephen Krashen (1992).

THE ACQUISITION-LEARNING HYPOTHESIS

The acquisition-learning hypothesis refers to the idea that language acquisition is a subconscious process, something that happens without our awareness and results in an unconscious storage of new knowledge. Language can be acquired at any age. Language learning, which is what we typically do in school, is a conscious process usually associated with "drills" and "grammar."

Language acquisition, rather than language learning, is what occurs through ENFI activities. Writing on the network results in language development that happens without students' awareness as they are engaged in activities (network communication) that are interesting, comprehensible, and thematically based. Krashen (1992) argues that activities of this kind, if there is enough comprehensible input, will automatically contain grammar that students are ready to acquire. While engaged in meaningful conversations, whether the topic is academic or social, language acquisition occurs without direct instruction. ENFI activities can include, however, language learning-type activities, as when network transcripts are used in follow-up classroom activities for targeted instruction.

THE NATURAL ORDER HYPOTHESIS

The natural order hypothesis states that there is a natural order to language acquisition, including second languages, that is impervious to language teaching. (The order may differ for first and second language learning.) In other words, a person who is not ready to acquire a grammatical feature, such as third person singular -s, cannot be taught this feature through drill, practice, or explanation. The natural order of language acquisition is the basis for our understanding of the developmental aspects of language.

Awareness of individual language development—what kinds of language structures and vocabulary students are ready for and what they are not—is clearly at work in the scaffolding that occurs on the network. During interactive activities, more proficient language users tend to shape their language use to match the developmental needs of less proficient language users.

This happens on the network, with written English, just as it occurs in the face-to-face interactions caretakers have with young children learning a first language. Through interactive language use, more proficient language users become sensitive to the needs of less proficient users, modeling, expanding, and clarifying—subconsciously—according to developmental needs.

THE MONITOR HYPOTHESIS

The monitor hypothesis posits that language is usually produced using our acquired competency. However, the conscious learning that one stores as a result of school teaching is sometimes used to "monitor" the output of our acquisition. In other words, we can employ what we consciously know about language to edit what we say, either before we say it, internally, or after we speak, to correct ourselves. Even so, the majority of our accuracy and fluency is based on acquisition. In fact, when we do employ conscious learning to monitor our language production it may slow us down and reduce our message as we focus more on the form of our output than the meaning.

Teachers who began with a focus on language "form," correcting errors in capitalization, punctuation, and spelling quickly realized that this undermined the potential of ENFI activities. Students began to write very little and to focus on writing correctly. When teachers focused on meaning, students seemed to feel freer to engage in discussions, and their contributions were longer and richer. Correction on the network was most effective when it happened incidentally, as part of a conversation in order to clarify meaning. Monitoring of language form as described here is most useful in discussions of transcript errors in follow-up activities in the classroom.

THE INPUT HYPOTHESIS

According to the input hypothesis, there is only one way that language is acquired, and that is through comprehensible input. We acquire language when we understand what we take in either through listening or through reading.

Based on the natural order of language acquisition, we can advance our competency only to the degree that we comprehend, and have acquired, language that is prerequisite to further development. This previously acquired linguistic knowledge, plus our "extralinguistic" knowledge—our knowledge of the world and of the situation — are what we use to acquire further language competency. In other words, our previous linguistic development, plus our use of context, helps us comprehend new input and progress to a higher level of development.

Through ENFI, students encounter language that is comprehensible. It is comprehensible because of the scaffolding more proficient language users engage in to match the development of less proficient users. This makes network-related reading unique; often the reading that takes place in school is based on a text assigned in common to a group of students. This type

of assigned reading will be comprehensible to some, but may not be to others. The text that students read on network interactions is unconsciously shaped, by fellow students and the teacher, to individual levels of proficiency. Comprehensibility is further heightened when the shared texts or topics are student-selected.

Network activities also demonstrate how deaf students use information they learn through their first language, American Sign Language, as "extralinguistic information" that helps them comprehend the written English they are experiencing on the network. Elsewhere in this book we have cited examples of signing off the network, conversations in ASL that the students held to help clarify aspects of English on the network. Discussions were also held in ASL preceding and following network activities to facilitate understanding.

THE AFFECTIVE FILTER HYPOTHESIS

The "affective filter," which includes such variables as anxiety, low self esteem, and separation of one's self from the group of target language users, may operate in a negative way to block an individual's ability to benefit from otherwise comprehensible language input. Conversely, Krashen argues that lowering the filter—minimizing the effects of these variables—may operate in a positive way to enhance language acquisition.

Frank Smith (1986) explains in detail the effects of language group identification in his discussion of "the learners' clubs." He explains that an important part of learning is developing the belief that you are the kind of person who can learn the targeted skill or knowledge. Lack of this belief is strong enough to override the effectiveness of instruction, amount of time spent on instruction, or motivation to learn. For example, individuals can be motivated to learn algebra and spend countless hours on algebra lessons, and still not learn algebra because they don't believe they are a "math-type person." They don't see themselves as members of the math learning club.

Club membership shapes one's identity; once you believe that you are a member of a certain club you apprentice yourself to other members of that club and learn what they do or know. If, however, experiences teach you that you are not a member of a particular club — not that kind of person — then you learn not to be like those people. In other words, you purposefully, although subconsciously, choose to act differently from those people.

Applied to language and literacy learning, the concept of the learners club has dramatic implications. Students labeled as having learning difficulties or reading problems may quickly learn that they are not members of the "literacy club" and act accordingly. Because of their affective filters, reading and writing become harder and harder to learn, regardless of instruction and desire. If second language learners cannot identify themselves as users of the language, they may never develop proficiency in that language, despite good instruction, motivation, and practice.

The implications of this hypothesis for deaf students learning English are doubly powerful. Very early, many deaf children learn that they are not members of the spoken English club. From there, they often learn that that they don't belong to the club of people who use written English either—the "literacy club." Believing that they are *not* readers and writers may override the best efforts of teachers and parents to teach them these skills. The problem is compounded when their literacy instruction is approached through traditional drill and practice, rather than through activities that are meaningful and interactive. They often fail to see the purpose for learning, and are eventually identified as problem readers and writers.

ENFI's greatest contribution may be that it appears to give these students a chance to join the literacy club. They learn that they can communicate in written English, and that it is accessible to them, unlike the spoken language, and that it does hold meaning for them. Gradually, as their confidence builds, they join the teacher and their fellow students in scaffolding each other to higher levels of proficiency with the language. The communicative aspect of the network enables them to develop conversation skills as well as higher levels of proficiency with the structure of the printed language.

In conclusion, what we have observed in the students on the network, over time, are changes in affect, as well as in written language performance. It is likely, too, that these changes work in tandem to foster further development. ENFI allows students to use written English to interact in interesting, meaningful ways. The changes in their development, including their affective filters, have resulted in ENFI becoming an exciting, effective component of our curriculum.

Appendix

Software Company Information

Aspects

Group Logic
1408 North Fillmore Street, Suite 10
Arlington, Virginia 22201
800-476-8781
Outside the U.S. (703) 528-1555
Fax (703) 528-3296
info@grouplogic.com

Daedalus Interchange

The Daedalus Group, Inc.
1106 Clayton Lane
Suite 250 West
Austin, Texas 78723
800-879-2144
info@daedelus.com

Group Writer

Sunburst Communications
101 Castleton Street
Pleasantville, New York 10570
800-321-7511

Realtime Writer

Realtime Learning Systems
2700 Connecticut Avenue, NW
Washington, DC 20008-5330
(202) 483-1510
800-TEACHPC

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About the Authors

Dr. Joy Kreeft Peyton is a Research Associate at the Center for Applied Linguistics in Washington, D.C., and was Co-Director of the Teaming with Text (computer networking) Project at Gallaudet University and Kendall Demonstration Elementary School. With Dr. Trent Batson, Martha French, and others at Gallaudet and Kendall, she pioneered the use of computer networks with deaf college students in 1986, and since then has worked with teachers from elementary school to university level to develop, study, and document their network use. She has also worked with teachers to implement and study other writing approaches, including dialogue journals and writing workshops, and has published widely on these and related topics.

Martha M. French is a curriculum specialist in the Center for Curriculum Development, Research, and Evaluation at Gallaudet University's Pre-College National Mission Programs and was a member of the Teaming with Text administrative team. Since joining the Center in 1981, she has focused exclusively on the language arts programs at Kendall Demonstration Elementary School and on national mission activities. She brings to her work extensive experience teaching deaf children, an M.Ed. in Deaf Education from Kent State University, and post-graduate coursework in reading from the Catholic University of America and the University of Maryland. Martha consults regularly with schools and programs throughout the nation, and is a frequent contributor to *Perspectives in Education and Deafness*, writing articles related to whole language instruction.

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